Sowing Seeds of Mobility: The Gender-biased Impact of Land Reform

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Motivation

- The process of structural transformation is the most salient fact of development.
- Barriers to structural transformation are detrimental to economic growth:
  A high rate of modern economic growth is attainable only if the required marked shifts in industrial structure are not too impeded by resistance of labor and of capital, of people and their resources in the old and accustomed grooves. (Kuznets, 1966)
- During the early stage of structural transformation, the transition away from agriculture often requires labor movement across regions.

This Paper

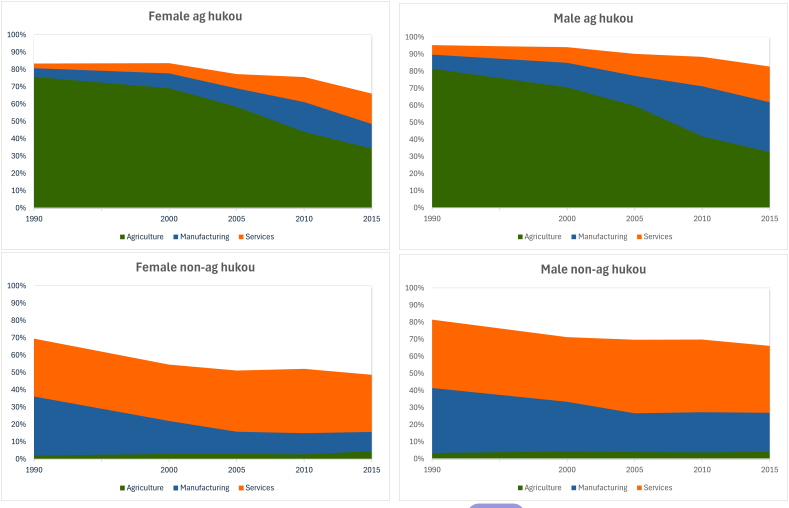
- Study the effects of barriers to structural transformation on employment by gender.
  - Typical patterns in developing countries: split-household migration (husband-migrate and wife-stay) and high female-intensity in agriculture.
- Focus on China's *hukou system* as a direct measure of mobility barriers.
  - Employs quasi-natural experiments resulting from two land policy reforms that create spatial variations in the timing of implementation across counties – found gender-biased effects.
  - Quantify the role of land policy in the household's decision of which member to migrate in a two-sector/region model.

Mobility barriers: the *Hukou* System in China

- Introduced in 1958 to curb migration, defined by sector and location.
- An impediment to labor mobility along two dimensions:
  - Land policy – "agricultural *hukou*" holders can farm the land *free of rent*, but do not own it. Reallocation risk for uncultivated or rented land – *use-it-or-lose-it*.
    $\rightarrow$ affects the incentive to leave the rural/agricultural sector.
  - Social subsidies – migrants (without local *hukou*) have to pay local taxes but do not qualify for the social subsidies such as education, health and housing.
    $\rightarrow$ affects the incentive to arrive at the urban/non-agricultural sector.
- Fraction of non-agricultural hukou increased from 16% to 36% while agricultural employment share declined from 68% to 21% during 1978–2013.

Hukou Document

Employment by Gender, by Hukou



Census, aged 17–64. Data

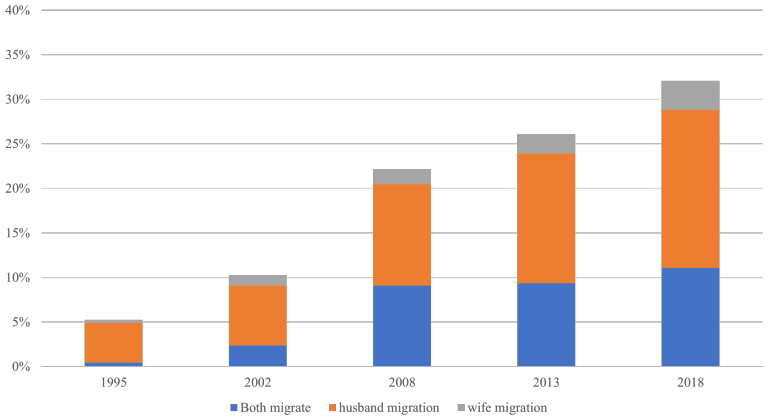
Sectoral Employment of Ag-houkou Holder

Agricultural-hukou female is less likely to be employed especially in non-ag sector.

Dependent Variable	Employment	Non-Ag Employment	Ag Employment
Female	-0.128***	-0.089***	-0.038***
	(0.014)	(0.007)	(0.011)
Individual Controls	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
# of Obs	15857311	15857311	15857311
adj. R-sq	0.138	0.187	0.198

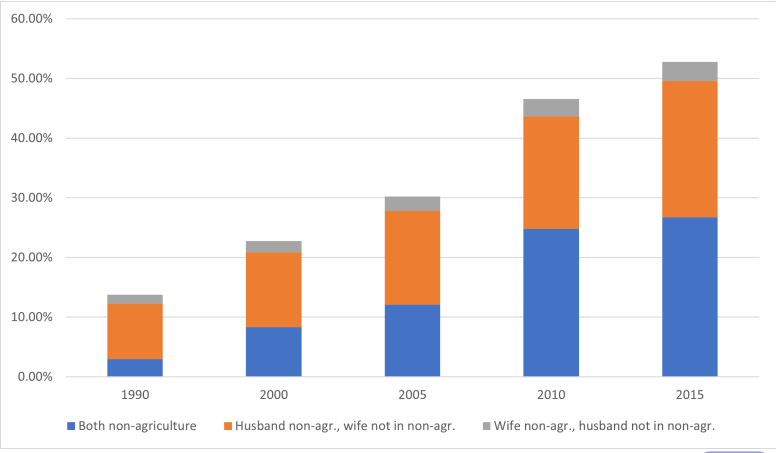
Notes: Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01. Controls include minority, age, age square, marital status, and education. Census 1990, 2000, 2005, 2010 and 2015 the ag-hukou holder sample (aged 17–64).

Migration Pattern of Rural Married Households



CHIP. Pairs of rural husbands and wives aged 17-64. Migrants: if an individual answers $\geqslant$6 months (180 days) to "How many days did you work away (live/work outside) from the household (your hometown)?" By age Data

Employment Pattern of Rural Married Households



Census. Pairs of rural husbands and wives aged 17-64 by sectoral employment. By age Data

Today's Presentation

- Focus on the land policy acting as mobility barriers:
  distort *the incentive to leave* agriculture/rural.
- Empirical findings: gender-biased impact of land reforms:
  - encouraged transition of rural female out of agriculture more than male
  - increased joint migration relative to husband-only migration.
  - reduce urban female employment relative to male.
- A model of household's migration decision: household members and spatial dimension.

Related Literature

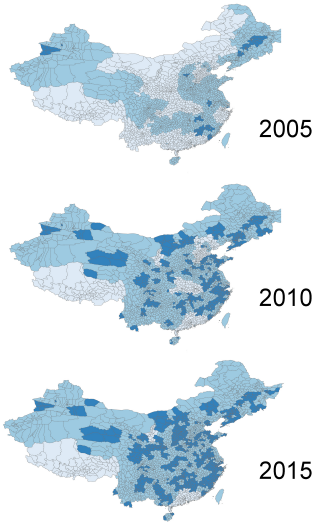
Empirical Findings

Land Reform Index

- To construct a direct measure of mobility barriers, we utilize two land reforms in rural China after 2003.
- A county-level land reform index
  - Measures the extent to which rental rights are secure.
  - Higher index, more secure rights, less land expropriation risks.
  - Constructed using nearly four thousand policy documents from pkulaw.com.

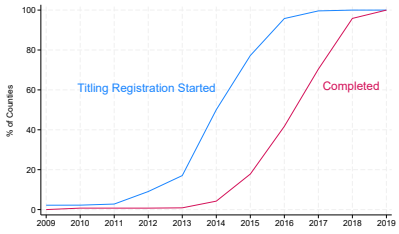
Land Contracting Reform (2003–2014): Two-Stage Roll-Out

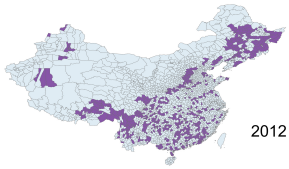
- The central government enacted the *Law on the Contracting of Rural Land* in 2003.
- Two-stage roll-out:
  - Provincial governments issued regulations on farmers' rights to contract or transfer land use rights to third parties from 2003 to 2010 (Chari et al., 2021).
  - Cities and counties further specified the procedures by issuing detailed regulations from 2004 to 2014.
- Index: 0 (no reform), 1 (provincial level), 2 (both provincial and sub-provincial level).

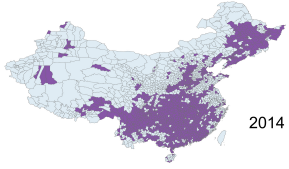


Land Titling Reform (2009–2019): Staggered Roll-Out

- Experiments started in 8 villages, 2009.
- Staggered roll-out at the county level.
- Certifying the land parcel (with detailed GIS infor.) took 2 years on average.
- Index: 0, 1 based on the completion year.

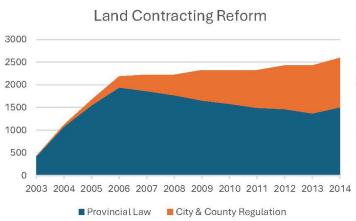


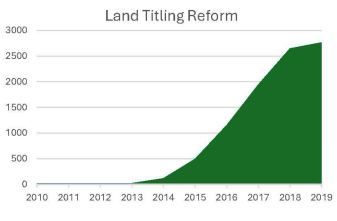


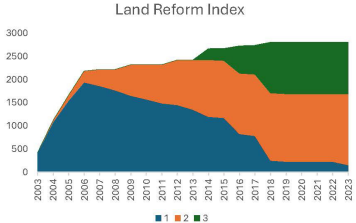


A County-level Land Reform Index

- A four-point scale index:
  - 0 No reform.
  - 1 Provincial regulations on land contracting reform issued.
  - 2 City/county regulations on land contracting reform issued.
  - 3 Land tilting reform also completed.







Impacts of Land Reforms

Impacts of Land Reforms

Using data on rural and urban individuals:

- Reduce land insecurity.
- Rural individuals: increase female migration and employment in non-agriculture, especially for married and less-educated individuals.
- Urban individuals: reduce female employment, especially for less-educated individuals.

Data sources:
Rural Fixed Point Survey, China Family Panel Survey, Urban Household Survey

Rural Individuals Data Urban Individuals Data

Land Insecurity Before Land Reforms

- Pre-existing land policy:

  Land is allocated based on household size for a set period, prioritizing active farmers, with the risk of reallocation before tenure ends. $\rightarrow$ *use-it-or-lose-it*.

- In a five-wave survey spanning 1999–2010 and covering 17 provinces, 77% of the rural population (Feng et al., 2014):
  - After the first round of land contracting in 1984, 80% of villages experienced reallocation by 1999 and 82% by 2001.
  - After the second round of contracting beginning in 1993, 40% of villages experienced reallocation by 2010.
- Land Insecurity pre-reform: we find when household member migrates or when farming day reduces, the probability of farmland reduction increases, RFPS (1995-2002).

Impact of Land Reforms on Land (In)security

- In 2010, 2014, 2016, 2018, and 2020 waves of CFPS, rural respondents were asked, "Has any of your family's land been expropriated in the past 12 months?"
- Utilized that to construct a household-level land insecurity proxy to test:
  1. the effect of household migration on the likelihood of land expropriation;
  2. how land reforms impact the relationship between migration and land insecurity.

$$LandExpropriated_{hot} = \alpha + \beta_1 Migration_{hot} + \beta_2 LandReform_{ot} + \beta_3 LandReform_{ot} * Migration_{hot} + \delta_h + \kappa_t + X_{ot}\Gamma + \epsilon_{hot}$$

- $Migration_{hot}$: household h had at least one member migrate from county o in year t.
- $LandReform_{ot}$: land reform index in origin county o in year t.

Impact of Land Reforms on Land (In)security

Dependent Variable	Rural Household Sample CFPS Rural Sample (2010–2020) Land Expropriated (=1)			
	(1)	(2)	(3)	(4)
Migrant (=1)	0.016***	0.014***	0.040***	0.043***
	(0.005)	(0.005)	(0.015)	(0.014)
Land Reform	-0.009	-0.010*	-0.008	-0.008
	(0.006)	(0.005)	(0.005)	(0.006)
Migrant * Land Reform			-0.013**	-0.014**
			(0.006)	(0.006)
County-level Control Variable	No	Yes	No	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	49712	47469	47469	47469

Notes: CFPS Rural Sample (2010–2020). The dependent variable is a dummy variable indicating whether the household lost land due to expropriation in year t. County-level control variables include county and village GDP per capita (logged), Share of secondary and tertiary industries, and population size (logged). Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Impact of Land Reforms on Rural Individuals

$$Migration_{iot} = \alpha + \beta_1 LandReform_{ot} + \beta_2 LandReform_{ot} * Female_i + \delta_i + \kappa_t + X_{ot}\Gamma + \epsilon_{iot}$$

- $Migration_{iot}$: Individual i migrated from rural origin county o in year t.
- $LandReform_{ot}$: land reform index in county o in year t.

  $\longrightarrow$ the *push* factor for migration

Potential Endogeneity of $LandReform_{ot}$?

- $LandReform_{ot}$, set by higher-level governments, is unlikely to be influenced by rural individuals.
- Individual fixed effect δ_i to control for the selection of migrants.
- Additional village and county economic controls X_{ot} to account for omitted variables (e.g., economic opportunity).

Impact of Reforms on Rural Individuals

Dependent Variables	RFPS (2003–2017)			
	Migration (=1)	Migration days (Logged)	Migration Income (Logged)	Farming labor days (Logged)
	(1)	(2)	(3)	(4)
Land Reform Index	0.002	0.014	0.006	0.007
	(0.005)	(0.025)	(0.044)	(0.029)
Land Reform Index * Female	0.009***	0.043***	0.098***	-0.064***
	(0.003)	(0.016)	(0.032)	(0.013) heightControl Variables
Yes	Yes	Yes	Yes	
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	454289	454289	454289	454289

Notes: Rural Fixed Point Survey 2003–2017. The dependent variables in columns 1 to 4 are: A dummy variable that equals one if the surveyed individual devoted any labor days to out-migration work during a year (the extensive margin); the logged total number of labor days spent on out-migration activities (the intensive margin); the logged income from out-migration activities; and the logged total labor days spent on farming. Individual control variables include age, a dummy variable indicating whether one is cohabiting with a partner, and education level. Economic control variables include county and village GDP per capita (logged), share of secondary and tertiary industries, and population size (logged). Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$. By Marital Status By Education

Impact of Reforms on Rural Married Couples

Husband-only versus Joint Migration

	Rural Couple Sample, Rural Fixed Point Survey (2003–2017)			
	Multinomial Regression		Probit Regression	
	(1)	(2)	(3)	(4)
	Husband-only versus No Migration		*Joint versus Husband-only Migration*	
Land Reform Index	0.065**	0.065**	0.057**	0.054**
	(0.030)	(0.030)	(0.023)	(0.023)
	Joint versus No Migration			
Land Reform Index	0.154***	0.147***		
	(0.045)	(0.045)		
Control Variables	No	Yes	No	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	79046	79046	58413	58413

Impacts of Reforms on Urban Individuals

$$Employment_{jdt} = \theta + \gamma_1 \sum_{o=1}^{O} \frac{MigInflow_{od} * LandReform_{ot}}{MigInflow_d} + \beta_2 \sum_{o=1}^{O} \frac{MigInflow_{od} * LandReform_{ot}}{MigInflow_d} * Female_j + \sigma_j + \pi_t + \upsilon_{jdt}$$

- $Employment_{jdt}$: Individual j in urban prefecture d has a paid job in year t.
- $\sum_{o=1}^{O} \frac{MigInflow_{od} * LandReform_{ot}}{MigInflow_d}$: a sum of land reform index in all origin counties o in year t, weighted by the share of migration flow from o to d to the total migration inflow to d in the base year (2000 census).

Potential endogeneity of the shift-share measure of land reforms?

- The land reforms took place in other prefectures.
- While the initial migration flow's effect may correlate with omitted variables, the fixed effects address this influence.

Impacts of Reforms on Urban Employment

	Urban Individual Sample					
	UHS (2002–2009)			CFPS (2010–2020)		
Dependent Variables	Employed (=1)	Dropout Labor Market (=1)	Income (logged)	Employed (=1)	Dropout Labor Market (=1)	Income (logged)
	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Land Reform Index	-0.013	0.002	-0.099*	0.032	-0.021	0.027
	(0.016)	(0.014)	(0.052)	(0.027)	(0.029)	(0.298)
Weighted Land Reform Index*Female	-0.021**	0.044***	0.011	-0.030**	0.019*	-0.092**
	(0.010)	(0.015)	(0.036)	(0.012)	(0.010)	(0.164)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	436161	436161	436161	31005	31005	23804

Notes: UHS (2002-2009) and CFPS Urban Sample (2010-2020). The dependent variables are employment status, where 1 denotes current employment in a paid, full/part-time job at the time of the survey for urban residents (columns 1 and 4), a binary variable indicating whether an urban resident opted for or was compelled to exit the labor market permanently (columns 2 and 5), and annual logged income (columns 3 and 6). Control variables in columns (4)–(6) include age, a dummy indicating whether one is cohabited with a partner, and education level, while columns (1)–(3) add working experience and ethnicity. Standard errors clustered at the county-year level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

By Education

Summary of Empirical Findings

- For rural *hukou* holders, the land reforms:
  - Increased land security for the rural households.
  - Encouraged transition of rural female out of agriculture relative to male.
  - Increased migration, especially joint spousal migration.
- For urban *hukou* holders, the land reforms:
  - reduced urban female employment relative to male.
  - The negative effect was stronger among lower income quantiles, potentially indicating competition at play.

Model

Environment

- There are two regions: rural and urban.
- Rural region produces agricultural goods and urban region produces non-agricultural goods: agricultural region/sector a, urban region/sector u
- Frictionless goods market: all consumers face the same prices.

Households

- A household consists of a female and a male member.
- Households with agricultural hukou have homogenous agricultural ability but with gender-specific non-agricultural abilities (γ_f, γ_m), drawn from distribution $F(.)$.
  - Migration decision: joint migration b, female-only f, male-only m, both stay o.

$$\alpha^o + \alpha^f + \alpha^m + \alpha^b = 1 - \alpha^u$$

- Households with urban hukou are homogenous.

Land Policy and Production

- Production of agricultural goods requires land K and labor N_{fa}, N_{ma}:

$$Y_a = A_a N_a^{1-\beta} K^{\beta}; \quad N_a \equiv \left[\xi_a \left(N_{fa} \right)^{\frac{\eta-1}{\eta}} + (1-\xi_a) \left(N_{ma} \right)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}.$$

- Land policy: total land income is $\beta p_a Y_a$ is allocated to agr-hukou households according to their type $i = o, f, m, b$:

$$\lambda^i I_k = \lambda^i \frac{\beta p_a Y_a}{\alpha^o \lambda^o + \alpha^f \lambda^f + \alpha^m \lambda^m + \alpha^b \lambda^b}$$

- The land policy parameters λ^i determine the land income received:

$$0 \leq \lambda^b < \lambda^f, \lambda^m \leq \lambda^o = 1$$

Production and Wages

- Production of non-agricultural goods uses only labor

$$Y_u = A_u N_u; \quad N_u \equiv \left[\xi_u \left(N_{fu}\right)^{\frac{\eta-1}{\eta}} + \left(1-\xi_u\right)\left(N_{mu}\right)^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}.$$

- The gender-specific wage in efficiency units is equal to the marginal product of labor in both sectors.

Household's Utility and Time Constraint

- A unitary household where members care about joint utility function:

$$U^i = \ln\left[\left(c_a^i - \bar{c}\right)^{\omega}\left(c_u^i\right)^{(1-\omega)}\right] + \theta^u \ln H^i \quad i = a, u$$

- The home-produced non-market goods is $H^i = \left[\left(h_f^i\right)^{\xi_h}\left(h_m^i\right)^{1-\xi_h}\right]$
- Each member allocates time between market and non-market activities:

$$n_g^i + h_g^i = 1; g = f, m, i = a, u$$

Household's Budget Constraint

- BC for urban households is

$$p_a c_a^u + p_u c_u^u \leq w_{fu} n_f^u + w_{mu} n_m^u$$

- BC for agricultural hukou depends on their abilities and migration decision:

$$p_a c_a^i + p_u c_u^i \leq I^i(\gamma_f, \gamma_m) \quad i = o, f, m, b$$

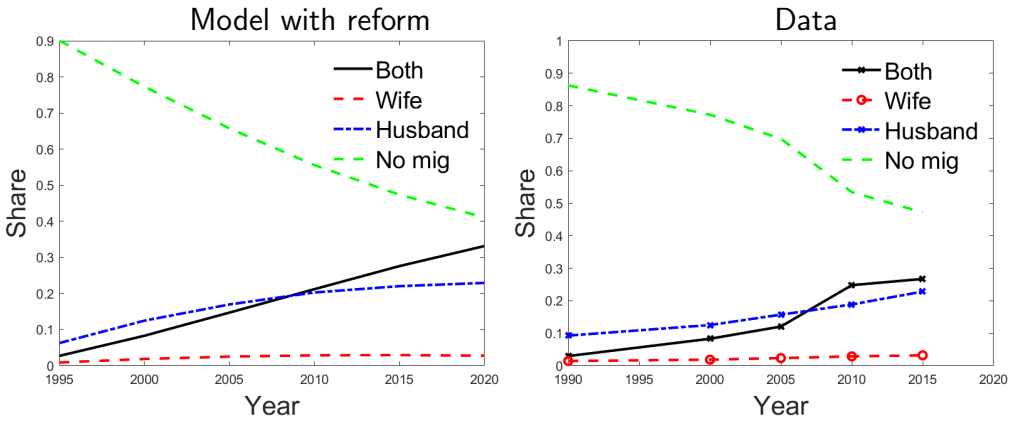
Labor Mobility Barriers

$$
\begin{aligned}
I^o &= w_{fa} n_f^o + w_{ma} n_m^o + \lambda^o I_k \\
I^f &= \mu \gamma_f w_{fu} n_f^f + w_{ma} n_m^f + \lambda^f I_k \\
I^m &= w_{fa} n_f^m + \mu \gamma_m w_{mu} n_m^m + \lambda^m I_k \\
I^b &= \mu \gamma_f w_{fu} n_f^b + \mu \gamma_m w_{mu} n_m^b + \lambda^b I_k
\end{aligned}
$$

There are two sources of labor mobility barriers for agricultural hukou members:

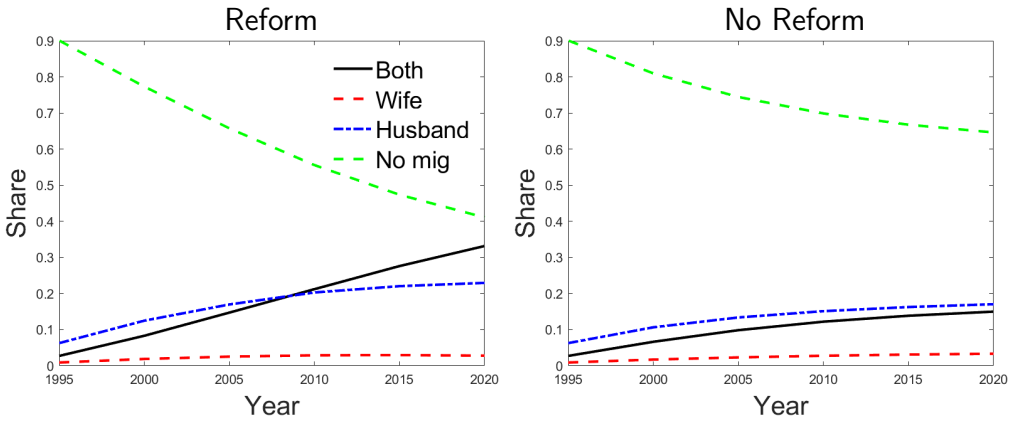
- Exogenous labor market wedge μ: migrant wages are lower than local either because of discrimination or they are not well-suited to the requirement of urban sectors (Meng and Zhang 2001, Demurger et al 2009)
- Land policy λ^i: a household with migrant receives less land income.

Migration Patterns: Model and Data

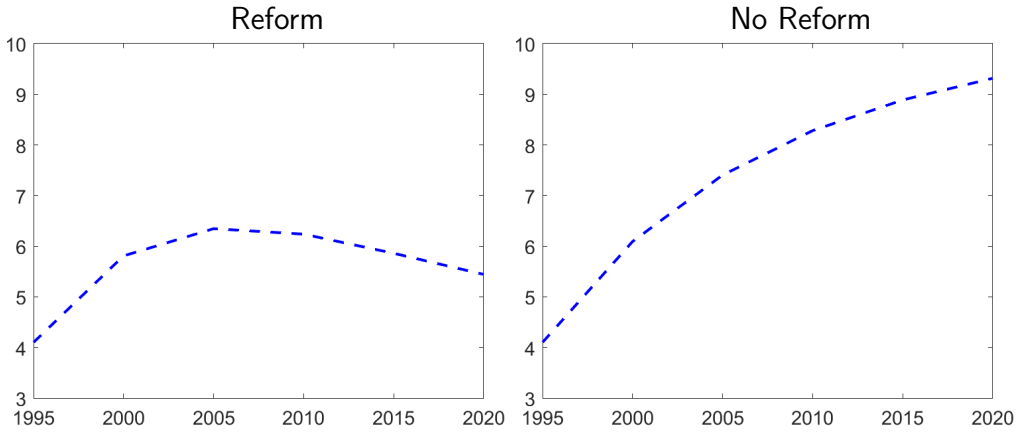


Note: Total ag hukou share normalized to 1. In the reform case, we matched the four shares in 2000 and the share of α_o in 2015. The 1995 data refers to the average of 1990 and 2000.

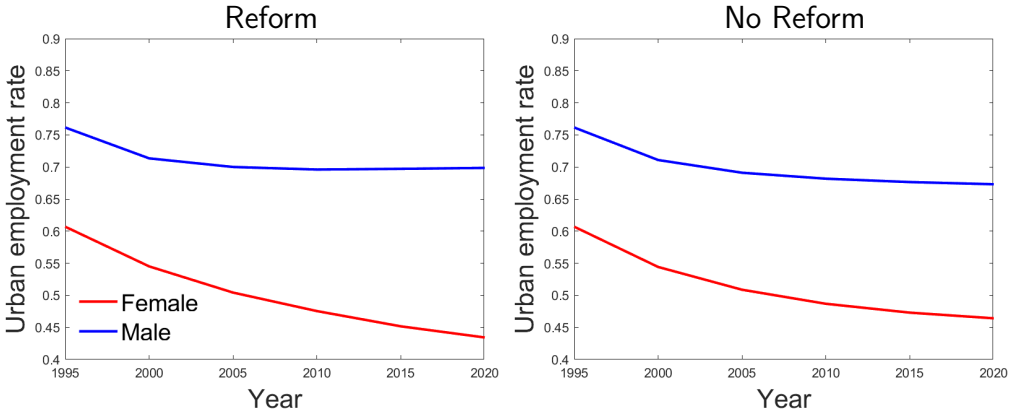
Migration Patterns



Agriculture Productivity Gap

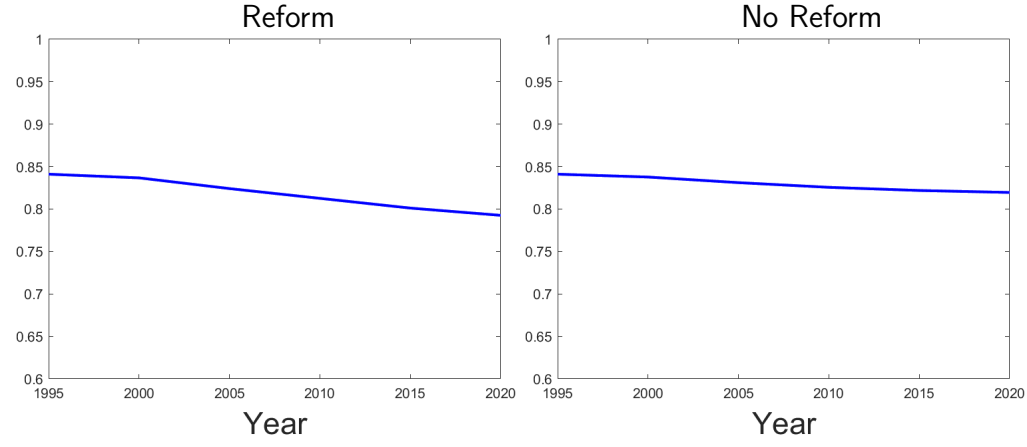


Urban Employment Rate



- Male employment rate falls by more in the no reform case, whereas female employment rate falls by more in the reform case.

Urban Relative Wage Rate



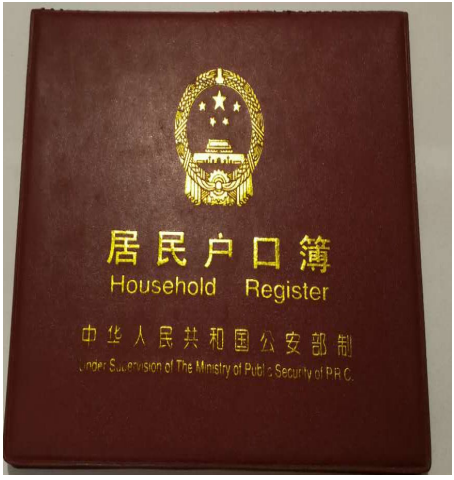
- Reform contributes to a larger decline in relative female wage rate

Summary

- Policies that appear to be gender neutral can have gender-biased impacts: due to sector-specific gender intensity.
- This presentation focuses on the land policy aspect of the *hukou* system: incentive to leave agriculture.
- Empirical results and quantitative model to show effects of land reforms:
  - increase land security
  - increased rural women's migration and employment in non-agriculture.
  - reduced urban women's employment through crowding-out, and can contribute to an increase in urban gender wage gap .

Additional Slides

Hukou Document



Document for a non-agricultural hukou in YiXing city, Jiangsu Province. back

Census: Summary Statistics

Variables	Obs.	Mean	SD	Min	Max
Employment	21,822,272	0.81	0.39	0	1
Ag Employment	21,822,272	0.50	0.50	0	1
Non-ag Employment	21,822,272	0.31	0.46	0	1
Gender (1=female)	21,822,272	0.49	0.50	0	1
Ag Hukou	21,788,012	0.73	0.45	0	1
Minority	21,822,272	0.08	0.28	0	1
Age	21,822,272	36.72	12.87	17	64
Marital Status	21,822,272	0.76	0.43	0	1
Education (high skill)	21,822,272	0.19	0.40	0	1

Censuses (1990, 2000 and 2010), One Percent Population Surveys (2005 and 2015)

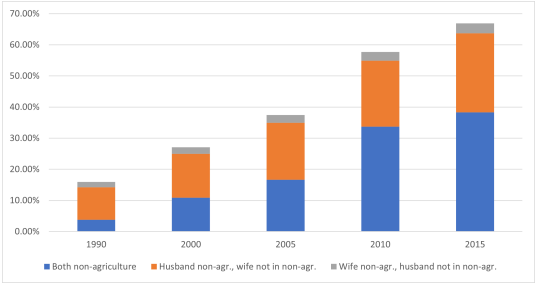
back

Census: Employment Pattern of Rural Married Households

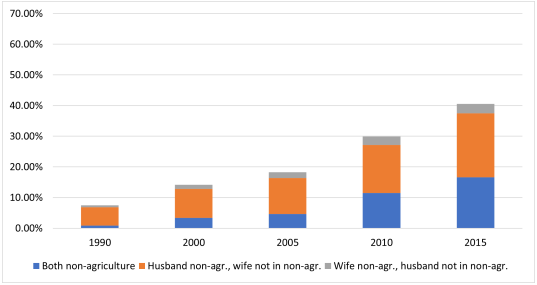
Rural Household Type	1990	2000	2005	2010	2015
Both not in non-agr.	86.26%	77.25%	69.82%	53.43%	47.22%
Both non-agriculture	3.00%	8.32%	12.08%	24.81%	26.73%
Husband non-agr., wife not in non-agr.	9.29%	12.54%	15.74%	18.87%	22.83%
Wife non-agr., husband not in non-agr.	1.46%	1.89%	2.36%	2.89%	3.22%

Notes: Census. The table reports the share of four types of rural married households by sectoral employment. Sample: Rural married households consisting of pairs of husbands and wives aged 17 to 64, both with agricultural hukou. For 2015, we use whether an individual has rural contracting rights as a proxy for hukou. back

Employment Pattern of Rural Married Households by Age Groups



Panel A: Young (aged 17–44)



Panel B: Old (aged 45–64)

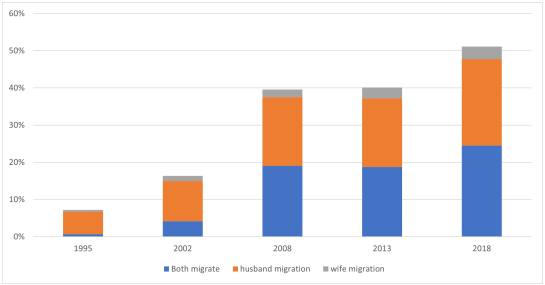
Census. Pairs of rural husbands and wives aged 17–44 (young) in Panel A and 45–64 (old) in Panel B. back

CHIP Rural Married Households: Summary Statistics

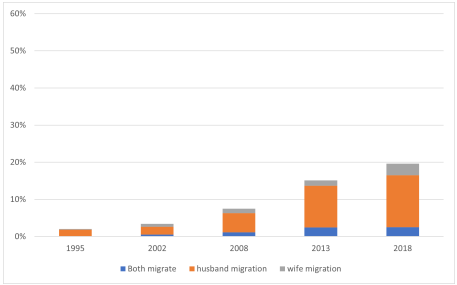
Variable	Obs	Mean	Std. Dev.	Min	Max
Employment	89,258	0.87	0.33	0	1
Non-ag employment	89,258	0.39	0.49	0	1
Ag employment	89,258	0.48	0.5	0	1
Age	89,258	43.9	10.5	17	64
Education (skill)	89,258	0.15	0.35	0	1
Number of children	89,258	1.46	0.95	0	7
Live with extended family	89,258	0.3	0.46	0	1

Chinese Household Income Project (CHIP) surveys of rural households 1995, 2002, 2008, 2013, 2018. Covers 19 provinces in 1995, 22 provinces in 2002, 9 provinces in 2008, 14 provinces in 2013, 15 provinces in 2018.
Questions: "How many days did you work away from the household; or live outside this household; or work outside your hometown?" back

Migration Pattern of Rural Married Households by Age Groups



Panel A: Young (aged 17–44)



Panel B: Old (aged 45–64)

CHIP. Pairs of rural husbands and wives aged 17–44 (young) in Panel A and 45–64 (old) in Panel B.

back

Related Literature

- In the context of China:
  - Barriers in shaping female employment (Brussevich et al., 2021, Qian, 2021) and family migration choices (Imbert et al., 2023; Cao et al., 2024) during structural transformation.
  - Land policy aspect of the *hukou* system (Ngai et al., 2019; Adamopoulous et al., 2024).
  - Empirical literature on the land and labor market impacts of *hukou* (Benjamin and Brandt, 2002; Deininger and Jin, 2009; Deininger et al., 2014; Chari et al., 2021; Liu et al., 2023; Shi et al., 2024) .
- This paper: examine how labor mobility barriers (land policy tied to *hukou*) impact migration and employment by gender during structural transformation.

Related Literature

- In other countries, including Africa:
  - Various mobility barriers during the structural transformation in the United States, Tanzania, India, and Indonesia (Caselli and Coleman, 2001; Beegle et al., 2011; Munshi and Rosenzweig, 2016; Bryan and Morten, 2019).
  - Land institutions as growth obstacles in Africa (World Bank, 2024) and the *use-it-or-lose-it* rule in communal land in Ethiopia and Tanzania (Gottlieb and Grobovšek, 2019; Manysheva, 2022).
- This paper: examine the gender-specific impacts of land mobility barriers on employment and migration within the context of China's *hukou* system.

back

Data on Rural Individuals

- Rural individual data to examine land insecurity pre-reform and assess the impacts of reforms:
  - Rural Fixed Point Survey (2003–2017) Summary Statistics
    - Nationally representative sample of 417 villages with 48,807 households and 339,724 individuals.
    - Individual panel with annual migration information.
  - China Family Panel Survey (2010–2020) Summary Statistics
    - Nationally representative sample with 19,646 households and 54,335 individuals from 1,233 counties.
    - Individual panel with annual migration information.
- Both include rich individual variables: gender, age, education, marital status.

back

RFPS: Summary Statistics

Variable	N	Mean	SD	Min	Max
Land Reform Index	537896	1.04	0.75	0	3
Weighted Hukou Reform Index	537896	2.94	0.87	1.03	5.93
Farm Labor Days	537896	2.49	2.37	0	5.90
Local Off-Farm Working Days	537896	1.32	2.21	0	5.90
Migration (=1)	537896	2.09	2.66	0	5.90
Migration Days	537896	0.39	0.49	0	1
Migration Days (Ratio)	475257	0.38	0.46	0	1
Migration Total Income	537896	1.56	3.33	0	15.43
Migration Cost	537896	1.99	3.41	0	17.89
Female	537896	0.48	0.50	0	1
Age	537896	37.23	10.91	18	55
Primary School and Below	168269	31.28%			
Middle School	299408	55.66%			
High School	56200	10.45%			
College or Above	14019	2.61%			
Married (=1)	537896	0.83	0.38	0	1

Rural Fixed Point Survey (RFPS), agri. hukou, aged 18-55, individuals Back

CFPS (Rural): Summary Statistics

Variable	N	Mean	SD	Min	Max
Land Reform Index	120734	1.78	0.83	0	3
Weighted Hukou Reform Index	120734	3.52	0.88	1.10	5.92
Migration (=1)	120734	0.11	0.32	0	1
Female	120733	0.50	0.50	0	1
Age	120734	36.77	10.86	18	55
Married (=1)	120734	0.74	0.44	0	1
Primary School and Below	48778	40.48%			
Middle School	45484	37.75%		0	1
High School	17556	14.57%		0	1
College or Above	8682	7.20%		0	1

China Family Panel Studies (CFPS), agri. hukou, aged 18-55, individuals

Back

Land Insecurity before Land Reforms (pre-2003)

- Before the land reform, reallocation risk for uncultivated or rented land (*use-it-or-lose-it*).
  - $\longrightarrow$ Someone stays to "guard" the land.
  - $\longrightarrow$ Wife stays—the split household.
- Would a household lose more land if it reduces farming days?

$$FarmLandDecrease_{ht} = \alpha + \beta_1(FarmDayReduction)_{ht} + \delta_h + \kappa_t + \epsilon_{ht}$$

- Can a household retain land if one member migrates compared to multiple?

$$FarmLandDecrease_{ht} = \alpha + \beta_1(At\ Least\ One\ Migrant)_{ht} + \beta_2(Multiple\ Migrants)_{ht} + \delta_h + \kappa_t + \epsilon_{ht}$$

Land Insecurity before Land Reforms (pre-2003)

Dependent Variable	RFPS (1995–2002) Farmland Decreases (Logged)			
	(1)	(2)	(3)	(4)
Zero Farming Day (=1)	0.260***			
	(0.035)			
Farming Day Reduction (%)		0.004***		
		(0.000)		
Migration (=1)			0.132***	0.083***
			(0.038)	(0.030)
Migration by more than 2 Members (=1)				0.354***
				(0.102)
Household Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	158486	158486	158486	158486

Notes: The dependent variable is household-level farmland size decreases (Logged). In column 1, Zero Farming Day (=1) represents a dummy variable for no farm labor by any household member in a year. Column 2 shows the percentage reduction in farm labor days for all household members compared to the previous year. Column 3 indicates migration by at least one member, while column 4 indicates migration by more than two members.

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Impact of Reforms on Rural Individuals

By Gender and Marital Status

Dependent Variables	RFPS (2003–2017)			
	Migration (=1)	Migration days (Logged)	Migration Income (Logged)	Farming labor days (Logged)
	(1)	(2)	(3)	(4)
Land Reform Index	0.002	0.014	0.004	0.000
	(0.005)	(0.026)	(0.046)	(0.029)
Land Reform Index * Married Women	0.011***	0.049***	0.108***	-0.066***
	(0.003)	(0.016)	(0.035)	(0.013)
Land Reform Index * Unmarried Women	0.002	0.003	0.010	0.040*
	(0.005)	(0.025)	(0.046)	(0.024)
Land Reform Index * Unmarried Men	0.002	0.007	0.041	0.007
	(0.005)	(0.028)	(0.049)	(0.033)
Control Variables	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	454289	454289	454289	454289

Notes: Individual control variables include age and education level. Economic control variables include county and village GDP per capita (logged), Share of secondary and tertiary industries, and population size (logged). Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

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Impact of Reforms on Rural Individuals

by Education Level

	Rural Individual Sample (Age 18-55) Rural Fixed Point Survey (2003–2017)							
Dependent Variables	Migration (=1)		Migration days (Logged)		Migration Income (Logged)		Farming labor days (Logged)	
	High School and Below	College and Above	High School and Below	College and Above	High School and Below	College and Above	High School and Below	College and Above
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Land Reform Index	0.005	0.020	0.028	0.095	0.074	0.022	-0.004	0.026
	(0.005)	(0.017)	(0.027)	(0.094)	(0.049)	(0.183)	(0.028)	(0.071)
Land Reform Index * Female	0.008**	0.044	0.035**	0.228	0.121***	0.480	-0.039***	0.039
	(0.003)	(0.027)	(0.017)	(0.151)	(0.032)	(0.301)	(0.014)	(0.113)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	351461	6840	351461	6840	351459	6840	351461	6840

Notes: Columns (1) to (3) use CFPS Rural Sample (2010–2020), while (4) to (9) use CHIP Rural Sample (1995–2018). The dependent variable is a dummy variable indicating migration. Columns 1, 4, 7 use the full sample, while columns 2-3, 5-6, and 8-9 use sub-samples categorized by education level. Control variables include age, a dummy variable indicating whether one is cohabiting with a partner, and education level. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

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Data on Urban Individuals

- Urban Individual Sample
  - China Family Panel Survey (2010–2020) Summary Statistics
    - Nationally representative sample with 8,582 households and 19,237 individuals from 1,004 counties.
    - Individual panel with annual employment information, allowing for TWFE.
  - Urban Household Survey (2002–2009) Summary Statistics
    - Nationally representative sample with 23,513 households and 532,956 individuals from 699 counties.
    - Repeated cross-sectional sample of individuals with rich information, including gender, age, education level, marital status, ethnicity, and working experience.

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CFPS (Urban): Summary Statistics

Variable	N	Mean	SD	Min	Max
Weighted Land Reform Index	35038	1.75	0.54	0.15	2.86
Hukou Reform Index	35038	4.01	1.71	1	6
Employment (=1)	35038	0.72	0.45	0	1
Dropout Labor Market (=1)	35038	0.14	0.35	0	1
Income (Logged)	26686	7.94	4.25	0	14.93
Age	35038	38.41	9.95	18	55
Female	35035	0.50	0.50	0	1
Married (=1)	33345	0.81	0.39	0	1
Primary School and Below	7754	16.88%			
Middle School	12644	27.52&			
High School	12182	26.51%			
College or Above	12320	26.82%			

China Family Panel Studies (CFPS), aged 18-55, non-agri. hukou, individuals

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UHS: Summary Statistics

Variable	N	Mean	SD	Min	Max
Weighted Land Reform Index	463134	0.293976	0.211925	0	1.006811
Hukou Reform Index	463134	2.415916	1.19436	1	6
Employment (=1)	463134	0.820713	0.383593	0	1
Dropout Labor Market (=1)	463134	0.12356	0.32908	0	1
Income (Logged)	463134	8.672882	2.701076	0	13.49594
Female	463134	0.505351	0.499972	0	1
Age	463134	39.89515	9.601407	18	55
Married (=1)	458824	0.846019	0.360931	0	1
Working experience	411692	799.9661	962.8757	1	2009
Han (=1)	463134	0.969963	0.170688	0	1
Primary School and Below	13705	2.97%			
Middle School	114322	24.77%			
High School	181289	39.28%			
College or Above	152176	32.97%			

Urban Household Survey (UHS), aged 18-55, non-agri. hukou, individuals Back

Impacts of Reforms on Urban Employment

by Education Level

Dependent Variables	Urban Individual Sample (Age 18-55) CFPS Urban Sample (2010–2020)					
	Employed (=1)		Dropout Labor Market (=1)		Income (logged)	
	High School and Below	College and Above	High School and Below	College and Above	High School and Below	College and Above
	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Land Reform Index	0.031	0.057**	-0.033	-0.027	0.035	0.063
	(0.044)	(0.024)	(0.049)	(0.022)	(0.082)	(0.082)
Weighted Land Reform Index * Female	-0.040**	-0.023	0.038**	0.022	-0.117***	-0.003
	(0.016)	(0.018)	(0.015)	(0.016)	(0.044)	(0.051)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21005	9668	21005	9668	10759	6784

Notes: CFPS Urban Sample (2010–2020). Columns 1–2, 3–4, and 5–6 use employment status, permanent labor market dropout dummies, and logged annual income as dependent variables. Control variables include age, a dummy indicating whether one is cohabited with a partner, education level and the prefecture level hukou registration reform index, which measures the ease of obtaining a local urban hukou. Standard errors clustered at the prefecture level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

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