Sowing Seeds of Mobility: The Uneven Impact of Land Reform*

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Abstract

We study how reducing mobility barriers from land-market frictions affects men and women differently, exploiting two major Chinese land reforms that strengthened rental rights. Using large-language-model text analysis, we map the reforms' rollout to build a county-level reform index. Linking this index to panel data, we find that the reforms move rural women out of agriculture more than men and reduce urban women's employment and wages relative to men. Embedding the reform index into a two-sector model with household-level decisions shows that land reforms interact with gender roles to generate these uneven impacts and raise non-farm employment and agricultural productivity.

JEL classification: O11, E24, J61, J22, J16

Keywords: Land, Labor mobility, Gender, Structural transformation

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1 Introduction

Structural transformation, the reallocation of economic activity across sectors, is a central feature of economic development. As Kuznets (1966) emphasized, mobility barriers that impede this process hinder economic growth.[1] These barriers can contribute to the large agricultural employment share and the productivity gap between agriculture and non-agriculture observed in many developing countries (Restuccia et al., 2008; Gollin et al., 2014).

In rural areas of many developing countries, land market frictions due to incomplete property rights can become an important form of labor mobility barrier. Farmers typically have only land-use rights, while land ownership remains communal, leading to inefficient or absent rental markets (Chen, 2017; World-Bank, 2024). As a result, transitioning out of agriculture may entail foregoing land income in addition to labor income, creating a labor market wedge between agricultural and non-agricultural sectors. An extreme example is the so-called "use-it-or-lose-it" practice, whereby failure to use the land can lead to its reallocation. Since land is central to agricultural production, such frictions constrain labor mobility and constitute a substantial barrier to structural transformation.

This paper takes a first step toward establishing, both empirically and theoretically, that such seemingly gender-neutral land market frictions can act as *gender-specific* mobility barriers, especially during the early stages of development. The idea is that households respond to these frictions by retaining some members on the farm as "guard labor" to protect land-use rights. Women are more likely to assume this role for two reasons. First, non-agricultural jobs, especially in manufacturing, often involve tasks and work environments considered more suitable for men. Second, agricultural work — particularly on family farms, a traditional form of "working from home" — is more compatible with women's greater responsibilities in home production such as cooking, cleaning, childcare, and elderly care. This perspective is particularly relevant for understanding why women are more likely to stay in agriculture than men, a fact documented by Lee (2024) for a large set of developing countries. It also highlights the importance of analyzing employment decisions at the household level.

[1] *"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)

China's land institutions under its *hukou* system, its subsequent land reforms that strengthened land-rental rights, and the availability of a large panel dataset *Rural Fixed Point Survey* (RFPS), which tracks rural individuals and households over two decades, provide a natural laboratory for studying the causal impact of labor mobility barriers arising from land market frictions. The *hukou* system classifies citizens as either agricultural or non-agricultural. Agricultural *hukou* holders can cultivate government-allocated land rent-free but may lose it if they do not farm it. This arrangement makes the implicit land market frictions common in developing countries both explicit and measurable.

The objective and contribution of this paper are threefold. First, we construct a granular, county-level land reform index using a large-language-model (LLM) text-based approach, capturing the rich temporal and spatial diffusion of reforms across China. Second, we combine this reform index with a large panel dataset to identify the *causal* impact of lowering mobility costs under the reform on employment outcomes by gender. Third, we use the index to quantify the employment and productivity effects of land reforms in a model that incorporates household-level employment decisions.

The county-level land reform index is constructed using two major top-down reforms aimed at strengthening farmers' land rental rights since 2003: the Rural Land Contracting Law and the land titling reform. We analyze over three million government policy documents, using keyword filtering and LLM-based validation to identify about 4,400 relevant documents. From these, we extract the timing of reforms and construct a novel, granular county-level land reform index that serves as a *direct* measure of mobility barriers.

We use the panel dataset RFPS to estimate the impacts of the reforms on employment and migration outcomes by gender. We find that the reforms have significantly strengthened rental rights, as reflected in the subsequent increase in rental activity and in average farm size. As a result, they have increased the transition out of agriculture, especially for women, and have increased joint spousal employment in non-farm work. We then use the nationally representative Chinese Household Income Project (CHIP) data to estimate the impact of land reforms on urban populations. Using a shift-share design, we find that land reforms widen the gender gap in employment and wages, particularly among individuals with a lower education level. This suggests that rural female migrants entering the non-agricultural sector create a substitution effect on urban women.

Motivated by uneven effects between genders and between rural and urban populations, we develop a household model to explore the underlying mechanisms that generate these disparities and to quantify the macroeconomic impact of lowering mobility barriers through land reform. The economy consists of an agricultural sector in the rural region and a non-agricultural sector in the urban region. Each household has one woman and one man. Households originating in the rural region have land-use rights, labeled agricultural *hukou*, while the rest have urban/non-agricultural *hukou*.

Agricultural-*hukou* households choose whether, and which member(s), work in non-agriculture, and land policy shapes these choices. They may forgo a share of their land income when engaging in non-agricultural work. Our policy parameters govern the share of land income retained under different employment choices. These parameters vary from 2000 to 2020 based on the county-level land reform index, defining the reform scenario of the model, while fixing them at 2000 levels defines the no-reform counterfactual.

Comparing the two scenarios, the model shows that land reforms increased non-agricultural employment more for women than for men by raising joint spousal migration relative to male-only migration. Gender differences arise from the interaction of "guard labor" and gender-specific productivity parameters: female labor has a lower production weight in non-agriculture than in agriculture, and women's exit from agriculture reduces the efficiency of the non-market sector. Hence, if a household needs to leave someone in agriculture to guard land income, women are more likely to assume this role. Reforms that remove the need for guard labor, therefore, benefit women more. The movement of rural workers to non-agriculture expands the labor supply and serves as a substitute for urban workers, especially urban women, lowering their relative employment and wages.[2]

Land reforms increase agricultural productivity by increasing land and working hours per agricultural worker. As workers leave agriculture, land per worker rises, which directly increases output per worker. This also raises return to agricultural work, leading to higher working hours. Our analysis indicates that land reforms account for about one-third of the observed decline in the agricultural productivity gap between 2000 and 2020.

[2]This provides a novel mechanism for the widening gender gaps among urban workers (Feng et al., 2017; Brussevich et al., 2021; Qian, 2023). See Dustmann et al. (2016) for a review on local labor market effects of immigration.

Lagakos (2020) highlights a literature gap, noting the need for more quasi-natural experimental evidence to identify the effects of mobility barriers.[3] Recent contributions include Sarvimäki et al. (2022), which exploits forced migrations in historical Finland, and Gai et al. (2025), which leverages China's Rural Pension Reform. We contribute by identifying the effects of reducing mobility costs through land reforms in China, a setting of broad relevance for other developing economies. Mobility barriers are also featured in the literature on labor misallocation, particularly with regard to the allocation of female labor (Hsieh et al., 2019; Lee, 2024; Chiplunkar and Kleineberg, 2024). Instead of assuming and inferring gender-specific mobility barriers from matching data moments, we empirically identify and directly measure gender-neutral barriers–land market frictions–that can act as gender-specific barriers.

Land market frictions and their economic implications have been examined in developing countries (de Janvry et al., 2015; Chen, 2017; Gottlieb and Grobovšek, 2019; Manysheva, 2022). We provide novel results on *the uneven impact across gender*. Our quantitative model for studying the role of land insecurity in China is closely related to Ngai et al. (2019) and Adamopoulos et al. (2024), but it differs in two key ways. First, we calibrate land-policy parameters directly from our land reform index instead of relying on survey-based reallocation frequencies. Second, we emphasize the employment decisions of couples to understand the impact by gender.[4]

Finally, our empirical analysis relates to Chari et al. (2021) and Liu et al. (2023), who study land contracting and titling reforms, respectively. Chari et al. (2021) find improvements in land allocation and productivity but no clear effects on employment, likely because they use provincial-level reform measures that obscure county-level variation (1,996 counties in 31 provinces).[5] Liu et al. (2023) find that land titling increases migration. We construct a granular county-level index that captures both reforms and by identifying positive effects on labor reallocation and migration, with uneven impacts between gender and between rural and urban populations.

[3]As discussed by Lagakos and Shu (2023), field experiments have also been used to evaluate mobility barriers and inform structural models; see, for example, Bryan et al. (2014) and Lagakos et al. (2023).

[4]See Imbert et al. (2025) and Cao et al. (2024) for the importance of employment and migration decisions at the household level. While Adamopoulos et al. (2024) examines migration decisions across age groups, we focus on gender and rural-urban interaction, driven by our empirical findings. Related results on different age groups will be discussed throughout the paper.

[5]Using the provincial index for different provinces, Shi et al. (2024) report higher non-farm employment but weaker effects for women; our county-level index shows stronger effects for women.

The remainder of the paper is structured as follows. Section 2 provides background on China's land institutions and describes the construction of our land reform index. Section 3 presents the main empirical findings for rural and urban populations. Section 4 introduces the model, and Section 5 conducts the quantitative exercise. Finally, Section 6 concludes.

2 Land Institutions and the Land Reform Index

This section outlines China's land institutions under the *hukou* system, posits the link between land insecurity and women's role as guard labor, and employs an LLM-based approach to build a novel county-level reform index for the empirical analysis in section 3 and the quantitative analysis in section 4.

The household registration system, known as *hukou*, was established in 1958 and acts as an internal passport to regulate migration. At birth, an individual is assigned one of two *hukou* types: "agricultural" or "non-agricultural".[6] We focus on the land policy aspect of the *hukou* system.[7] The 1986 Land Management Law explicitly stated the collective ownership of agricultural land and recognized agricultural *hukou* households' rights to use the land. However, land could be reallocated if household members do not engage in farming.[8] This discourages the development of the land rental market. Formal land rental markets were virtually non-existent, and when land was rented out, it was typically through informal, verbal agreements that yielded very low rents.[9]

[6]In addition to agricultural/non-agricultural dichotomy, *hukou* classifies individuals by the registration place—the administrative region that issued their *hukou*. As of 2020, over 50% of the population holds an agricultural *hukou*, and the system has gradually relaxed status changes. More details on China's *hukou* system are provided in the online Appendix B1.

[7]A second aspect is that entitlements to social services, such as education and healthcare, are often tied to one's registration place. Migrant workers who leave their *hukou* location typically do not have access to these services at their destination.

[8]This practice has been extensively documented by the literature, see, for example, Kung and Liu (1997); Brandt et al. (2002).

[9]The 1998 revision of the law aims to strengthen land-use rights by formalizing 30-year contracts between village collectives and individual households. However, the transfer or leasing of these land-use rights remained heavily restricted. By 2000, fewer than 10% of farmers rented out land (Deininger and Jin, 2005).

2.1 Land Insecurity and Gendered Patterns of Guard Labor

Land (in)security refers to the extent to which land holders have legally protected rights over land use and transfer. Such rights enable investment, land rental or transfer, and labor mobility without the risk of losing the land. In the presence of land insecurity, the transition from agriculture to non-agriculture can result in a loss of land, incentivizing households to leave one member behind to continue farming in order to safeguard the land.

We present two sets of suggestive evidence to support our idea that women are more likely to take on this role of "guard labor". First, using data on individuals with agricultural *hukou* from the Chinese Population Census and the One Percent Population Survey (1990-2020). Appendix Table A1 shows that women are less likely than men to be employed in the non-agricultural sector, controlling for a rich set of factors such as ethnic minorities, age, age squared, marital status, skill (education), province fixed effects, and year fixed effects. More importantly, this employment pattern also holds for married couples.[10] We categorize couples into four types: (1) both spouses employed in non-agriculture, (2) husband-only employed in non-agriculture, (3) wife-only employed in non-agriculture, and (4) neither employed in non-agriculture.[11] Appendix Figure A1 displays the shares of these four types of couples. In the earlier years, households where only the husband worked in the non-agricultural sector dominate. Over time, the share of couples where both spouses work in non-agriculture has increased, especially after 2005.[12]

Then, using data from the Rural Fixed Pointed Survey (RFPS), we show that these employment patterns are related to mobility barriers that arise from land insecurity. The RFPS provides household-level information on non-farm employment and out-migration activities between 1995 and 2017, as well as corresponding individual-level

[10]Most couples share the same *hukou* type. Census data on married couples show that the share of mixed *hukou* couples among those aged 18–55 was about 5% from 1990 to 2010 and increased slightly to around 9% during the 2015–2020 period.

[11]To emphasize the "use-it-or-lose-it" aspect of land policy, we focus on total non-agricultural employment, which includes both local non-farm work and migration outside the county for non-farm jobs. In the 1980s and early 1990s, Township and Village Enterprises (TVEs) are the main source of local non-farm work. Since 2000, however, growth in non-agricultural employment has been driven mainly by the urban non-agricultural sector. See Figure 1 of Ngai et al. (2019), based on data from Brandt and Zhu (2010).

[12]The online Appendix Figure B1 shows that the pattern outlined in Figure A1 holds for both the young and old age groups. Using CHIP data for 1995–2018, Online Appendix Figure B2 shows a similar pattern when focusing on migration instead of employment.

data from 2003 to 2017. In addition to the annual regular RFPS, we have access to a special one-off supplementary survey on village governance conducted by RFPS in 2006. This survey asked village cadres to recall instances of major land redistribution (*Datiaozheng*) from the 1970s through 2006, which we use as a proxy for villagers' experienced land insecurity.[13]

Table A2 in the Appendix presents results using household-level data from 1995–2006 and individual-level data from 2003–2006. These tests confirm that land insecurity, proxied by redistribution, negatively affected both households' and individuals' participation in non-farm employment and out-migration. More importantly, the individual-level results show that higher land insecurity has a larger negative effect on women's non-farm employment and out-migration. This finding is consistent with our hypothesis that women are more likely to stay on the farm as guard labor.

2.2 Two Land Policy Reforms

Since 2003, China has implemented two major top-down land reforms: the land contracting reform (2003–2014) and the land titling reform (2010–2019). The land contracting reform, initiated by the Rural Land Contracting Law (RCLC) in 2003, granted agricultural households the legal right to lease and rent farmland—rights that had previously been largely based on informal agreements. Following the national legislation, provincial governments issued detailed regulations on leasing, transfers, and dispute resolution between 2003 and 2010. Soon after, the prefecture and county governments introduced specific administrative procedures and legal directives.

However, legally clarifying agricultural households' rights was only one part of safeguarding land property rights. Land titling or certification was crucial for securing *de jure* rights, as it not only facilitated direct contracting between landowners and lessees, but also guaranteed judicial protection for land property rights. Therefore, the central government issued its No. 1 Document launching the land titling reform in 2010, before completing land contracting reform at the local level.[14] Beyond issuing standardized land-use certificates to each agricultural household, the titling reform

[13]Major land redistribution refers to the reallocation of more than 30% of village land by village cadres. Despite this strict threshold, a substantial fraction of villages experience such reallocation, with considerable regional disparities in reallocation frequency. Since 1976, our data show that 26% of villages experienced redistribution once, 31% twice, 23% three times, 10% four times, and 10% five or more times, with some villages experiencing up to eight redistributions during this period.

[14]Small-scale pilot programs began in eight villages in 2009.

aimed to establish a unified, digitalized national land registration system.

Since then, subnational governments have followed central directives by developing and implementing detailed local plans. It is important to note that the "ownership" established through this system refers specifically to the right to rent, not the right to sell the land. The new system records comprehensive information, including household ownership, demographic data, identity of household heads, family relationships, and precise GIS-based parcel boundaries. The completion of the land titling reform in 2019 marked a major milestone in improving land tenure security in China's agricultural sector.

2.3 Land Reform Index

To construct a numerical measure that traces these two reforms, we begin by performing keyword searches in the `pkulaw.com` database to identify legal and government documents related to land contracting and land titling reform.[15] Table B5 in the Online Appendix lists the keywords used and the number of documents identified by administrative level. In total, we located 4,522 potentially relevant documents: 3,451 related to the land contracting reform and 1,071 related to the land titling reform.

Next, we employ *Doubao*, a leading Chinese large language model developed by ByteDance, to verify the substantive relevance of each document. We first provide *Doubao* with the central government policy documents on the two reforms to establish a benchmark. Then, using its API service, we iteratively prompt the model to assess whether each local document pertains to the same reform and,[16] if so, to extract the most relevant sentences supporting its classification. Through this validation process, we identify 4,413 documents as truly reform-related. Finally, we extract information on the administrative level, location, and year from these verified documents to construct our comprehensive land-reform index. Figure B3 in the Online Appendix provides examples of policy documents from various administrative levels.

[15] As of September 2024, this database—maintained by the Legal Information Center of Peking University and one of the most comprehensive of its kind—contains 4,049,703 documents issued by local governments (provincial, prefectural, and county levels) and 454,035 documents issued by central authorities.

[16] For example, the following prompt: "Read (1) the {central policy document} on land contracting reform, compare it with (2) the {local policy document}, and if (2) concerns the implementation of the same reform in (1), return 1; otherwise, return 0. If your answer is 1, please extract the most relevant sentences from (2) that support your judgement." has been used in prompt engineering.

Building on the two-stage rollout of contracting reform at the provincial and prefecture/county levels, we construct our land reform index. A county scores 1 point if its provincial government has issued a relevant document, plus an additional 1 point if either the county itself or its prefecture has released a local regulation. Thus, a county can achieve a maximum of 2 points for land contracting reform. By 2014, about 92% of counties were governed by either provincial or local regulations, with 39% covered by both.

The land titling reform was launched in 2009 before the completion of the contracting reform. Counties were given autonomy to set the start dates and implementation strategies for this reform. There was significant spatial variation in completion timing, likely driven by differences in bureaucratic capacity and local challenges in delineating land boundaries.[17] Given the continuity between both reforms and the crucial role of land titling reform in improving land security, we assign a score of 3 to counties that have completed the titling reform, regardless of their status on contracting reform.[18]

Based on the above description, our land reform index ranges from 0 to 3. Figure 1 illustrates the spatial diffusion of the phased reforms. Both reforms followed a top-down implementation process, initiated by the central government's "No. 1 Document" (Chari et al., 2021; Liu et al., 2023). The hierarchical diffusion of policies from provinces to prefecture and county levels suggests that the staggered roll-out was likely independent of regional socioeconomic conditions. If anything, variations in timing may partly reflect differences in local administrative capacity. Nevertheless, we assess and verify the randomness of the implementation timing through balance tests (see Appendix Table A3).

To further establish the exogeneity of land reforms, we treat the completion of each reform at the county level as a separate policy shock and employ a staggered difference-in-differences (DiD) design to examine its impact on employment and migration patterns. Figure 2 illustrates the temporal effects of the land contracting and titling reforms, with the left and right panels corresponding to each reform. The upper panels display non-farm employment, and the lower panels display migration decisions. We merge the individual-level data (2003–2017) from the RFPS

[17]Counties handle platform setup, imagery procurement, survey team selection, staff training, dispute resolution, and printing of registries and land rights certificates.

[18]In some counties, contracting reform was bypassed entirely, with only titling reform being implemented. The latter marked a qualitative shift from administrative enforcement to judicial protection, institutionalizing and deepening the security of agricultural *Hukou* holders' land property rights.

and our county level reform index for this test, controlling for a rich set of individual and regional economic and policy variables. Utilizing multiple estimators from recent methodological advances in the DiD literature, we confirm the absence of pre-reform trends in either non-farm employment, nor migration patterns, validating the key identification assumption for our setting. The event-study results reveal that, approximately three years after local implementation, both reforms produced statistically significant positive effects on agricultural households' non-farm employment and on outmigration.

Our land reform index improves existing measures in two fundamental ways. First, it exploits more granular county-level variation stemming from the staggered roll-out of contracting reforms at provincial and prefectural/county levels. Second, it incorporates both contracting and titling reforms, providing a more comprehensive measure of changes in land property rights from 2003 to 2019.

3 Empirical Analysis

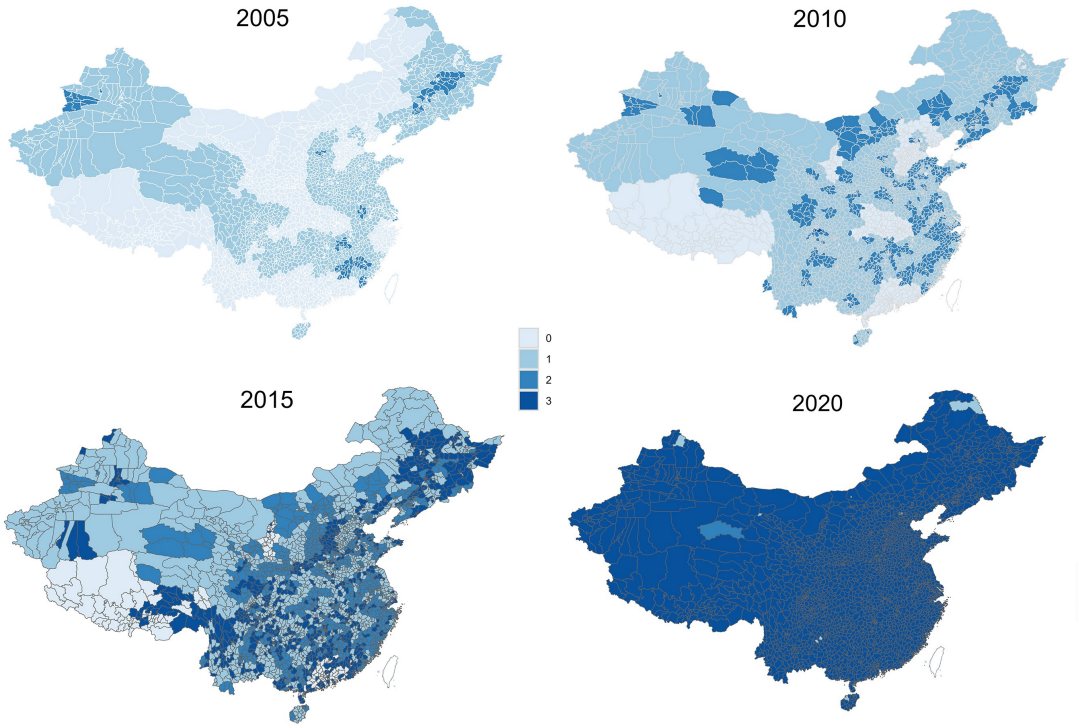
This section presents empirical evidence on the impact of land reforms across gender and between rural and urban populations since 2003. We analyze the employment and migration outcomes of rural agricultural *hukou* holders, as well as the employment and wage income of non-agricultural *hukou* holders. Details on the data sources and the main variables used in this section can be found in Appendix A1.

3.1 Impact of Land Reforms on Land Security

Several studies have documented substantial improvements in land security for Chinese farming households following the 2003 reforms. Using a five-wave survey that spans 1999–2010 and covers 17 provinces and 77% of the rural population, Feng et al. (2014) find that while 82% of villages experienced land reallocation by 2001, this figure had dropped to 40% by 2010. A more recent study by Adamopoulos et al. (2024), using two retrospective surveys on the historical frequency of village-wide land reallocations, finds that reallocation events among 120 sampled villages declined from 155 occurrences between 1991–2003 (a probability of 9.9%) to 16 occurrences between 2003–2018 (0.9%).

While directly testing the impact of land reforms on land security is challeng-

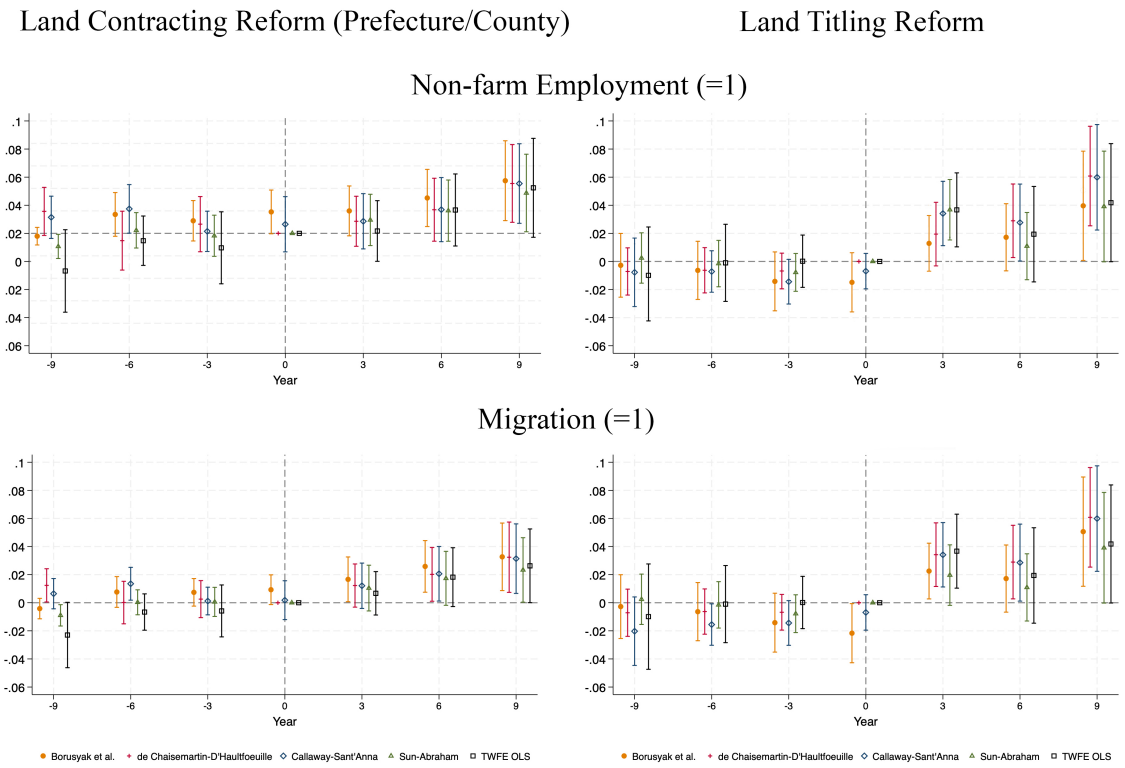
Figure 1: The Spatial Diffusion of Land Reform, 2005–2020



Note: This figure matched the county-level land reform index with the 2010 Chinese county-level GIS map. Darker colors represent a higher land reform Index, reflecting greater depth and broader reform scope within each county. Our reform index takes four potential values: 0 (No reform), 1 (Provincial regulations on land contracting reform issued), 2 (Prefecture/county regulations on land contracting reform issued), and 3 (Land titling reform completed, regardless of contracting reform).

ing due to the limited availability of high-quality longitudinal data on village-level land reallocations, Chari et al. (2021) provide an indirect validation by showing that provincial land contracting reforms led to more active land rental markets among affected households. In a similar vein,by combining our county-level land reform index—which captures both contracting and titling reforms—with household-level data from RFPS on land rental activities and agricultural production, we find that land reforms significantly increased household-level land rental activities. Specifically, as shown in Appendix Table A4, they raise the probability and area of land rented out, as well as the income derived from these rentals.

Figure 2: Event Studies of the Land Reforms on Migration



Note: Rural Fixed Point Survey 2003–2017, aged 18–55. This figure displays the separate effects of the land contracting and titling reforms for nine years leading up to nine years after the reforms, shown in the left and right panels, respectively on non-farm employment (upper panels) and migration outcomes (lower panels). All specifications include individual fixed effects and year fixed effects. Individual controls include age, a dummy for cohabitation with a partner, and education level. Economic controls include county- and village-level GDP per capita (logged), the shares of manufacturing and tertiary industries, and population size (logged). Policy controls include the weighted non-land-related hukou reform indices (Gai et al., 2025), along with a dummy for whether a county adopted the New Rural Pension Reform.

3.2 Impact on Rural Households

We now turn to the impact of land reforms on rural agricultural *hukou* holders. Using individual-level data from the RFPS covering the years 2003 to 2017, we restrict the sample to individuals aged 18–55 who self-report as physically healthy. This restriction ensures demographic comparability between the rural and urban samples. We then analyze their employment and migration outcomes using the following specifi-

cation:

$$Y_{iot} = \alpha + \beta_1 LandRef_{ot} + \beta_2 LandRef_{ot} * Female_i + X_{it}\Phi + \delta_i + \kappa_t + X_{ot}\Gamma + \epsilon_{iot} \quad (1)$$

where Y_{iot} denotes a dummy variable that captures one of two related outcomes for a rural individual i in county o and year t: (1) non-agricultural employment, indicating whether the individual devoted any labor days in the non-farm sector–either locally or non-locally, or (2) migration, indicating whether the individual spent any labor days working outside county o in the non-agricultural sector.

$LandRef_{ot}$ represents the land reform index in county o in year t. We interact this index with the individual-level indicator $Female_i$ to assess whether the impact of reform differs by gender. We argue that the land reform index is unlikely to be endogenous due to omitted variables that could be correlated with individual outcomes. First, the staggered roll-out of land reforms was determined by provincial and/or prefecture and county governments, independent of individual factors. Second, we include a rich set of regional economic and policy control variables (X_{ot}) to capture the potential confounding factors that influence the timing of the reforms. These variables include the logged county and village GDP per capita, the GDP shares of manufacturing and tertiary industries, logged population size, the intensity of non-land-related *hukou* reforms in destination cities,[19] and a dummy variable indicating whether a county adopted the New Rural Pension Reform. Third, the RFPS tracks the same agricultural *hukou* households and individuals over time, allowing us to control for unobserved selection factors at the individual level. Thus, we control for individual fixed effects δ_i, year fixed effects κ_t, and a rich set of individual-level variables X_{it} (such as age, education level, and marital status). Standard errors are clustered at the county level to safeguard against potential heteroskedasticity.

Individual Employment and Migration Outcomes—Columns (1) and (4) of Table 1 present the results for two outcomes: the non-farm employment dummy and

[19]This non-land-related *hukou* reform index, constructed by Gai et al. (2025), measures the difficulty migrants face in obtaining urban *hukou* status in their work locations. While land reforms push agricultural *hukou* holders out of agriculture, these *hukou* reforms in destination cities serve as pull factors for rural out-migration. In our regression, we weight Gai et al. (2025)'s index by the share of migration from origin county o to destination city d relative to the total out-migration from county o (based on the 2000 Census). This weighted index captures the exposure of county o to *hukou* reforms in all potential destination cities.

the migration dummy.[20]

Table 1: Impact of Reforms on Rural Individuals' Employment and Migration Outcomes, by Gender

Dependent Variables	Rural Individual Sample RFPS (2003–2017)					
	Non-farm employment (=1)			Migration (=1)		
	All	High School and Below	College and Above	All	High School and Below	College and Above
	(1)	(2)	(3)	(4)	(5)	(6)
Land Reform	0.010*	0.010*	-0.001	0.010**	0.009**	0.020*
	(0.005)	(0.005)	(0.012)	(0.004)	(0.004)	(0.012)
Land Reform * Female	0.008**	0.008**	0.026	0.007***	0.008***	0.010
	(0.004)	(0.004)	(0.017)	(0.002)	(0.002)	(0.017)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358949	351461	6840	358949	351461	6840

Notes: Rural Fixed Point Survey 2003–2017, aged 18–55. The dependent variable in columns 1 to 3: A dummy variable equal to one if the surveyed individual devoted any labor days to non-farm employment during a year, while that in columns 4 to 6: A dummy variable equal to one if the surveyed individual devoted any labor days to out-migration work during a year. Columns 1, 4 use the full sample, while columns 2–3, and 5–6 use sub-samples categorized by education level. 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), shares of manufacturing and tertiary industries, and population size (logged). Policy control variables include the weighted non-land-related *hukou* reform indices (Gai et al., 2025), along with a dummy variable indicating whether a county adopted the New Rural Pension Reform. All specifications control for individual fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

The findings show that land reform has a stronger positive effect on rural women's participation in non-farm employment and out-migration than on men. Specifically, the probability of females transitioning to non-farm employment increases by about 0.8 percentage points more than that of males when the land reform index increases by 1 point. With the index on a four-point scale (0–3), a full reform from 0 to 3 corresponds to a 2.4 percentage points increase in this outcome (column (1)). For migration, the magnitude is similar. Rural women's migration probability increases by about 0.7 percentage points more than that of men when the land reform index

[20]We observe agricultural *hukou* holders' migration decisions annually because when they migrate to work in urban areas, they typically retain their agricultural *hukou* status. While migrants can potentially change their *hukou* registration, this process remains difficult and costly for most rural residents.

increases by 1 (column (4)).

To compare the impact of each reform separately, we use three dummy variables — provincial land contracting reform, prefecture/county land contracting reform, and land titling reform — to replace the comprehensive land reform index. Table A5 in the Appendix reports the results using the same specification as Table 1. Regarding non-farm employment, while the three individual reforms have insignificant impacts on men, both local-level land contracting reform and land titling reform have positive and significant effects on women. In terms of migration, both provincial-level land contracting and land titling reforms increase men's migration. However, the effects of local-level land contracting and titling reforms are significantly larger for women than for men.

Taken together, these results are consistent with those obtained using the comprehensive reform index, reinforcing that local implementation matters most. They also align with existing evidence: Chari et al. (2021) report no significant impact on migration when examining only the provincial-level contracting reform, whereas Liu et al. (2023) find a significant effect of the county-level titling reform. Using our comprehensive reform measures, we confirm that both reforms exert significant effects on migration, especially when they progress to the local level.

Next, we assess the impact by education level. We categorize individuals into two groups: those with lower education (high school and below) and those with higher education (college and above). We repeat the baseline regressions on non-farm employment and migration for each group. The results for the lower education sample are reported in columns (2) and (5) of Table 1, while those for the higher education sample are shown in columns (3) and (6). The findings suggest that the impact on females is primarily driven by the lower-education group, as the interaction terms between the land reform index and the female indicator are statistically significant only in columns (2) and (5). Notably, their magnitudes are comparable to those observed in the full sample.

To test whether the positive effects on women vary by marital status, we replace the female dummy in Equation 1 with three group indicators: married female, unmarried female, and unmarried male, using married male as the reference group. Appendix Table A6 shows that the positive effect of land reform on rural women's migration is mainly driven by married women, while the increase in non-farm employment is driven by both married and unmarried women.

Finally, to assess robustness across age groups, as emphasized by Adamopoulos et al. (2024), we re-run the baseline regression (Equation 1) on two sub-samples: individuals aged 18–44 and those aged 45–55. The Online Appendix Table B6 suggests that gender differences in the impact of land reform are more pronounced in the younger group (aged 18–44).

Household Employment and Migration Outcomes—To assess the impact of land reforms at the household level—specifically, the rise of households where both spouses work in non-agriculture, as discussed in section 2—we extract the RFPS subsample in which married couples can be reliably identified.[21] We consider four outcomes for households' employment: joint non-farm employment, husband-only non-farm employment, wife-only non-farm employment, and no non-farm employment, along with the analogous migration outcomes: joint migration, husband-only migration, wife-only migration, and no migration.

We use both multinomial and binary logistic regression to examine the effect of land reform on the likelihood of different non-farm employment and migration patterns, relative to no non-farm employment or no migration. In all specifications, we add the same set of regional control variables as in Table 1, and the micro-level control variables including both spouses' education and age, as well as couple and year fixed effects.

Table 2 reports the estimation results. Columns (1) and (2) report outcomes for non-farm employment and migration, respectively. Each of the three main rows compares one type of non-farm employment (migration) outcome relative to both spouses staying in farming (neither migrating). The results indicate that land reform significantly increases the likelihood of "husband only" and "both" engaging in non-farm employment (migration) compared to the base category. Notably, the coefficient is larger for the "both" category, suggesting a stronger reform effect on joint couple mobility. This finding is further corroborated by the binary logit estimations in columns (3) and (4), which directly compare "both" against "husband only" cases, confirming that reforms increase the relative likelihood of joint participation versus husband-only participation in non-farm employment and migration.

[21] RFPS does not provide identifiers for all married couples within each household, but we can still identify household heads and their spouses using information on the relationship with the household head.

Table 2: Impact of Reforms on Rural Married Couples

	Multinomial Logistic Regression		Logit Regression	
	Non-Farm	Migration	Non-Farm	Migration
	(1)	(2)	(3)	(4)
	vs. No Non-Farm/Migration			
Wife only Non-Farm/Migration	0.067	0.085		
	(0.067)	(0.065)		
	vs. No Non-Farm/Migration			
Husband only Non-Farm/Migration	0.077**	0.121***		
	(0.033)	(0.036)		
	vs. No Non-Farm/Migration		vs. Husband only Non-Farm/Migration	
Both Non-Farm/Migration	0.106***	0.151***	0.086***	0.192***
	(0.041)	(0.050)	(0.029)	(0.029)
Control Variables	Yes	Yes	Yes	Yes
Couple FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	55282	44883	31121	18769

Notes: RFPS 2003–2017, pairs of married couples aged 18–55 with agricultural *hukou*. Columns (1) and (2) use multinomial logistic regression to compare Wife only Non-Farm/Migration, Husband only Non-Farm/Migration, and Both Non-Farm/Migration versus both in farming/neither migrating. Columns (3) and (4) use logit regression to compare Both non-farm/migration versus the husband only non-farm/migration. Individual control variables include the husband's age, the wife's age, the husband's education level, and the wife's education level. Economic control variables include county and village GDP per capita (logged), shares of manufacturing and tertiary industries, and population size (logged). Policy control variables include the weighted non-land-related *hukou* reforms (Gai et al., 2025), along with a dummy variable indicating whether a county adopted the New Rural Pension Reform. All specifications control for couple fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

Robustness Checks on Individual Outcomes—The results discussed so far in this subsection rely on RFPS data from 2003 to 2017. Next, we assess robustness using two additional data sources: the rural agricultural *hukou* samples from CFPS and CHIP. The CFPS, a panel dataset covering 2010 to 2020, offers more balanced sub-samples across various education levels compared to the RFPS,[22] whereas the CHIP is a nationally representative survey available for the years 1995, 2002, 2007, 2013, and 2018. Given the differences in data structure, we include year and individual fixed effects when using the CFPS, and year and county fixed effects when using the CHIP, while maintaining the same set of controls as in Table 1.

We first apply the specification in Equation 1 to the full rural samples from CFPS and CHIP. The results are reported in Panel A and Panel B of the online Appendix

[22]In RFPS, the sample of rural individuals with a college education and above accounts for only 2.2% of the total observations, as opposed to the 12.5% in CFPS. Further details about CFPS can be found in Appendix A1 D.

Table B7, respectively. Consistent with the findings in Table 1, land reforms encourage rural *hukou* individuals to transition to non-farm employment, with a larger impact on women than men (column (1) in Panel A and column (7) in Panel B). Similarly, different impacts by gender are also observed for migration (column (4) in Panel A and column (10) in Panel B). In the remaining columns, we divide the samples by education levels and run the same regression on lower- and higher-educated sub-samples. Reassuringly, these heterogeneity tests confirm the earlier pattern: land reforms disproportionately benefit less educated rural women.

3.3 Impact on Urban Households

To examine the spillover effects of land reforms on urban non-agricultural *hukou* holders, we use the urban sample from six CHIP waves (1995, 1999, 2002, 2007, 2013, and 2018). As with the rural sample, we restrict to individuals aged 18 to 55 who self-report as physically healthy. The specification is as follows:

$$Emp_{jdt} = \theta + \gamma_1 Index_{dt} + \gamma_2 Index_{dt} * Female_j + \gamma_3 Female_j + X_{jt}\Phi + \sigma_d + \pi_t + X_{dt}\Gamma + \upsilon_{jdt}, \tag{2}$$

where Emp_{jdt} indicates whether non-agricultural *hukou* holder j in prefecture d in year t is currently employed in a paid, full- or part-time job. It is important to note that agricultural *hukou* holders who migrate to work and reside in prefecture d are excluded from the urban sample. We also estimate the same regression using the reported log annual income as the outcome, in place of Emp_{jdt}.

$Index_{dt} = \sum_{o=1}^{O} \frac{MigInflow_{od} * LandReform_{ot}}{MigInflow_d}$ represents the weighted land reform index for destination prefecture d in year t. This shift–share–like variable weights each origin county o's land reform index, $LandReform_{ot}$, by its share of migrants received in destination d, $\frac{MigInflow_{od}}{MigInflow_d}$, where $MigInflow_{od}$ denotes the migrant inflow from origin o to destination d, and $MigInflow_d$ is the total migrant inflow to destination d. The migration flow is constructed using the 2000 Population Census, which predates the implementation of land reforms and thus helps to mitigate endogeneity concerns. Analogous to a shift–share instrumental variable, this measure captures the heterogeneous exposure of each destination prefecture to land reforms, with the share component serving as a pre-reform "intent-to-treat" measure. For ease of interpretation, we rescale the weighted land reform index to range from 0 to 1.

Similar to Equation 1, we interact the weighted land reform index with gender. We

include regional controls X_{dt} such as prefecture-level GDP per capita (logged), GDP share of secondary and tertiary industries, and population size (logged) and individual controls X_{jt}, including age, cohabitation with partner (dummy), education level, work experience, and ethnicity, plus prefecture- and year- fixed effects. Standard errors are clustered at the prefecture level to safeguard against potential heteroskedasticity.

Empirical Results— Columns (1) and (2) of Table 3 report results for employment status (=1 employed in a paid, full or part-time job at the time of the survey) and for annual logged wage income. The results show that the rural land reforms decrease the likelihood of urban non-agricultural *hukou* females being employed and reduce their annual wage income. In contrast, no such effects are observed for urban males. In terms of magnitude, a rise in the weighted index from 0 to 1 lowers female employment by 2.8 percentage points relative to men (column (1)) and reduces annual wage income by 5.1 percent relative to men (column (2)).

Table 3: Impacts of Reforms on Urban Employment

Dependent Variable	Urban Individual Sample CHIP (1995–2018)					
	Employed (=1)	Income (Logged)	Employed (=1)	Income (Logged)	Employed (=1)	Income (Logged)
	All		Low Education		High Education	
	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Land Reform	-0.011	0.037	-0.017	0.096	-0.073	0.024
	(0.644)	(0.046)	(0.394)	(0.110)	(0.195)	(0.081)
Weighted Land Reform * Female	-0.028***	-0.051**	-0.042***	-0.071**	0.070	-0.033
	(0.008)	(0.026)	(0.009)	(0.036)	(0.046)	(0.118)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	104175	74175	69345	51678	24805	18496

Notes: This table is based on urban samples from CHIP (1995–2018), including individuals aged 18–55 with non-agricultural *hukou*. The dependent variables are employment status, where 1 denotes employment in a full/part-time paid job at the time of the survey (columns 1, 3, and 5) and logged annual wage income (columns 2, 4, and 6). Control variables include gender, age, a dummy indicator for cohabitation with a partner, education level, work experience, ethnicity, city GDP per capita, shares of secondary and tertiary industries, and population size (logged). All specifications control for prefecture fixed effects and year fixed effects. Standard errors clustered at the prefecture level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

The negative impact of land reforms on urban female employment may reflect a substitution effect from the influx of rural female migrants. If this is the case, urban women with lower education would be expected to bear the larger impact. Table 3

further reports regression results for lower-education (columns (3) and (4)) and high-education (columns (5) and (6)) sub-samples. Reforms implemented in rural areas have a significant negative effect on urban women with a high school education or less. This aligns with the findings from Table 1, which show that lower-educated rural women are most likely to migrate in response to the reforms. Taken together, the results support the interpretation of a substitution effect.

4 Model

To explore the underlying mechanisms that generate the different outcomes by gender, we build and calibrate a quantitative model featuring employment decisions at the household level. There are two sectors, the agricultural sector (denoted by subscript a) in the rural region and the non-agricultural sector (denoted by subscript u) in the urban region. There is a continuum of households with measure 1, each consisting of one female and one male member. A fraction α^u of households that originated in the urban region have a non-agricultural *hukou*, and a fraction $(1 - \alpha^u)$ that originated in the rural region have an agricultural *hukou*.[23] Households with agricultural *hukou* have the land use right. To focus on the mobility barriers created by land policy for agricultural *hukou* holders, we make two assumptions. First, goods markets are frictionless and all consumers face the same price. Second, households with non-agricultural *hukou* only work in the non-agricultural sector.[24] A representative household head makes consumption and employment decisions on behalf of all urban households, where working in the non-agricultural sector requires a fixed number of work hours, denoted by $\bar{n}$.

Households with agricultural *hukou* can either work in the agricultural sector by cultivating the land allocated by the government rent-free or in the non-agricultural sector. Each household decides the sector of employment for both members. Those who remain in agriculture choose the number of hours to work on the farm. The sectoral choice implies that there will be four types of agricultural *hukou* households: both members remain in the agricultural sector (type o), the female member works in the non-agricultural sector (type f), the male member works in the non-agricultural

[23]Both household members are assumed to hold the same type of *hukou* as mixed-*hukou* couples are rare according to census data.

[24]This assumption is consistent with the empirical pattern observed in China where almost none of the non-agricultural *hukou* holders work in the agricultural sector.

sector (type m), and both members work in the non-agricultural sector (type b). Let α^i, where $i = o, f, m, b$, represent the equilibrium share of these four types of households:

$$\alpha^o + \alpha^f + \alpha^m + \alpha^b = 1 - \alpha^u \tag{3}$$

Land policy plays a crucial role in the sectoral choices of agricultural *hukou* households and hence affects the speed of structural transformation. It determines whether they are able to receive rental income, and how much, when they move away from farming. We next formalize this potential rental income through a parameter λ^i, which varies by the type of agricultural household, for $i = o, f, m, b$.

4.1 Land Policy and Production

The production of agricultural goods requires land as an input:

$$Y_a = A_a N_a^{1-\beta} K^{\beta}; \quad N_a \equiv \left[\xi_a \left(N_{fa}\right)^{\frac{\eta-1}{\eta}} + (1-\xi_a)\left(N_{ma}\right)^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}. \tag{4}$$

where K denotes land, while N_{fa} and N_{ma} denote the total female and male work hours in the agricultural sector, respectively. The wage is equal to the value of the marginal product of the worker for each gender:

$$w_{fa} = (1-\beta) p_a A_a \xi_a \left(\frac{K}{N_a}\right)^{\beta} \left(\frac{N_a}{N_{fa}}\right)^{\frac{1}{\eta}} \tag{5}$$

$$w_{ma} = (1-\beta) p_a A_a (1-\xi_a) \left(\frac{K}{N_a}\right)^{\beta} \left(\frac{N_a}{N_{ma}}\right)^{\frac{1}{\eta}} \tag{6}$$

The total land income $\beta p_a Y_a$ is allocated to households with agricultural *hukou*. The land policy parameter λ^i determines the amount of land income received by each household depending on their employment decisions. Specifically, the land income received by a type i agricultural household is equal to $\lambda^i I_k$, where:

$$0 \leq \lambda^b \leq \lambda^f = \lambda^m \leq \lambda^o = 1; \quad I_k \equiv \frac{\beta p_a Y_a}{\alpha^o \lambda^o + \alpha^f \lambda^f + \alpha^m \lambda^m + \alpha^b \lambda^b}, \tag{7}$$

where a λ^i value less than 1 captures the case that land is reallocated away from

household i.[25] The values of λ^i will be set in subsection 5.1 to match our empirically constructed land reform index.

The production of the non-agricultural goods uses only labor:

$$Y_u = A_u N_u; \quad N_u \equiv \left[\xi_u \left(N_{fu}\right)^{\frac{\eta-1}{\eta}} + (1-\xi_u)\left(N_{mu}\right)^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}. \tag{8}$$

where N_{fu} and N_{mu} denote the quantity of female and male labor used in the non-agricultural sector, respectively. The wage is equal to their corresponding value of the marginal product of labor for each gender:

$$w_{fu} = p_u A_u \xi_u \left(\frac{N_u}{N_{fu}}\right)^{\frac{1}{\eta}}, \quad w_{mu} = p_u A_u (1-\xi_u)\left(\frac{N_u}{N_{mu}}\right)^{\frac{1}{\eta}}. \tag{9}$$

4.2 Households

Agricultural *Hukou* Households Depending on their sectoral choices, agricultural *hukou* households have the following joint utility function:

$$U^i = \ln\left[\left(c_a^i - \bar{c}\right)^{\omega}\left(c_u^i\right)^{(1-\omega)}\right] + \theta \ln H^i + \ln \varepsilon^i; \quad i = o, f, m, b, \tag{10}$$

where ε^i is a preference shifter for becoming each of the four types, $\bar{c}$ is the subsistence level of agricultural goods, c_a^i and c_u^i represent the consumption of agricultural and non-agricultural goods purchased from the market, and H^i is the non-market goods produced at home.

Each individual member has one unit of time to allocate between market work n_g^i and non-market activities h_g^i:

$$n_g^i + h_g^i = 1; \quad g = f, m. \tag{11}$$

The non-market hours here include both home production hours and leisure hours. Depending on the type of household, the non-market good H^i is produced as follows:

$$H^i = \delta_f^i \delta_s^i (h_f^i)^{\xi_h} (h_m^i)^{1-\xi_h}; \quad i = o, f, m, b. \tag{12}$$

[25] See Ngai et al. (2019) for a model where land policy is represented by interpreting $1-\lambda^i$ as the probability that land is reallocated away from household i.

$$\delta_f^i = \begin{cases} \delta_f \leq 1 & if \;\; i = f, b \\ 1 & if \;\; i = o, m \end{cases}; \qquad \delta_s^i = \begin{cases} \delta_s \leq 1 & if \;\; i = f, m \\ 1 & if \;\; i = o, b. \end{cases}$$

where $\delta_f \leq 1$ means that when female members move to non-agriculture, non-market goods production is less efficient,[26] and $\delta_s \leq 1$ captures the disutility when couples split into different sectors. These parameters reflect social norms and attitudes toward women's roles in home production and perceptions of split couples.

After observing the set of preferences $(\epsilon^o, \epsilon^f, \epsilon^m, \epsilon^b)$, agricultural *hukou* households make their sectoral employment decisions, which in turn determine their budget constraints for consumption decisions:

$$p_a c_a^i + p_u c_u^i \leq I^i; \quad i = o, f, m, b. \tag{13}$$

For members employed in the agricultural sector, they choose the hours of work. Those who move to the non-agricultural sector work a fixed number of hours, denoted by $\bar{n}$, and earn a fraction μ of the wage received by the local worker. This wage discount reflects evidence from the literature that migrants often face discrimination or possess skills that are not well suited to the requirements of urban sectors (Meng and Zhang, 2001). In other words, the parameter μ captures other labor market barriers that are beyond the scope of this paper.

The total household income for each of the four types of agricultural households is composed of both labor and land income, which depends crucially on the land policy:

$$I^o = w_{fa} n_f^o + w_{ma} n_m^o + \lambda^o I_k, \tag{14}$$

$$I^f = \mu w_{fu} n_f^f + w_{ma} n_m^f + \lambda^f I_k, \tag{15}$$

$$I^m = w_{fa} n_f^m + \mu w_{mu} n_m^m + \lambda^m I_k, \tag{16}$$

$$I^b = \mu w_{fu} n_f^b + \mu w_{mu} n_m^b + \lambda^b I_k. \tag{17}$$

Non-Agricultural *Hukou* Households The utility is given by

$$U^u = \ln \left[(c_a^u - \bar{c})^\omega \, (c_u^u)^{(1-\omega)} \right] + \theta \ln H^u; \quad H^u = (h_f^u)^{\xi_h} (h_m^u)^{1-\xi_h}. \tag{18}$$

[26] CHIP survey evidence for rural married aged 18–55 shows women cite "looking after seniors/children" as a key migration constraint in 2008, 2013, and 2018 (about 28% of women vs. 10% of men). Online Appendix Table B8 reports regression evidence on the determinants of non-farm employment and migration for females and males, respectively.

The representative household head chooses the employment rates for the female and male members, E_f and E_m, respectively. Given that non-agricultural work involves fixed hours $\bar{n}$, the time constraint implies:

$$h_f^u = 1 - E_f\bar{n}, \quad h_m^u = 1 - E_m\bar{n}, \tag{19}$$

and the budget constraint for the urban household is:

$$p_a c_a^u + p_u c_u^u \leq I^u = w_{fu}\bar{n}E_f + w_{mu}\bar{n}E_m. \tag{20}$$

4.3 Equilibrium

The labor market clearing conditions by gender and sector satisfy:

$$\begin{aligned} N_{fa} &= \alpha^o n_f^o + \alpha^m n_f^m, & (21)\\ N_{ma} &= \alpha^o n_m^o + \alpha^f n_m^f, & (22)\\ N_{fu} &= (\alpha^b + \alpha^f)\bar{n} + \alpha^u \bar{n}E_f, & (23)\\ N_{mu} &= (\alpha^b + \alpha^m)\bar{n} + \alpha^u \bar{n}E_m. & (24) \end{aligned}$$

The full derivation of the model is presented in Appendix A2. We assume that the preference shifter ε^i is independently drawn from a Fréchet distribution with CDF $e^{-\epsilon^{-\kappa}}$. Given this assumption, the share of each type of household i, which will be used in the calibration, is derived as:

$$\alpha^i = (1-\alpha^u)\frac{(V^i)^\kappa}{(V^f)^\kappa + (V^m)^\kappa + (V^b)^\kappa + (V^o)^\kappa} \quad , \quad i = o, f, m, b. \tag{25}$$

where V^i is defined as the indirect utility that the agricultural *hukou* household derives from its optimal employment and time allocations, given the preference shifter:

$$\ln(V^i\epsilon^i) \equiv \max U^i(\epsilon^i), \quad i = o, f, m, b. \tag{26}$$

5 Quantitative Results

This section calibrates our quantitative model, utilizing the land reform index constructed in section 2. The quantitative exercises allow us to explore the mechanisms

Table 4: Baseline Land Policy Parameters

	2000	2005	2010	2015	2020
$\lambda^o = \lambda^f = \lambda^m$	1	1	1	1	1
λ^b	0	0.21	0.37	0.59	1

Notes: The land policy parameter λ^b is calibrated to the national average of the land reform index. The 2020 value of λ^b is very close to 1, so it is rounded to 1.

underlying the empirical findings in section 3 and quantify the macroeconomic effects of removing mobility barriers associated with land market frictions.

5.1 Calibration

Our baseline model calibrates land policy parameters using the empirical reform index and matches the observed household employment patterns from 2000 to 2020. We then simulate a counterfactual scenario with no land reform.

We begin by calibrating the land policy parameters. For households with both members working in agriculture, λ^o is set to 1 throughout. For households with one member in agriculture, the remaining member can guard the land in the event of reallocation, so they retain the full share of land income, i.e., $\lambda^f = \lambda^m = 1$. For households with both members working in the non-agricultural sector, we set $\lambda^b = p_n$, where p_n is the probability of no land reallocation:

$$\lambda^o = \lambda^f = \lambda^m = 1, \quad \lambda^b = p_n \tag{27}$$

We estimate p_n using the land reform index from section 2. The probability of no reallocation, p_n, is equal to 1 when the reform is completed nationwide (average index = 3). Thus, we calculate p_n as the national average of the land reform index divided by 3. As reported in Table 4, the diffusion of land reform implies an increasing λ^b over time, reaching 1 in 2020 when almost all counties have completed the reform (see Figure 1).

The growth rate of A_u, denoted as g_u, is directly set using sectoral employment and real output data from the China Statistical Yearbook (CSY). The growth rate of A_a, denoted as g_a, is endogenously calibrated so that the model-implied growth rate of labor productivity in agriculture matches its empirical counterpart calculated from

the CSY. We normalize A_a and A_u in 2000 to be 1.

We now turn to the parameters that are directly set and do not vary over time. The share of non-agricultural *hukou* α^u is set to be 0.27, calculated from the 2000 Census. The elasticity of substitution between female and male workers, η, is set to 2, a common value in the literature (Ngai and Petrongolo, 2017). We normalize the total endowment of land, K, to 1. The land share, β, is set to 0.5 to match the reported land income share in China (Cao and Birchenall, 2013). The number of hours worked per employed individual in the non-agricultural sector is set at 48.5 hours per week, i.e., $\bar{n} = 0.485$, based on the average hours in the urban sector reported by the National Bureau of Statistics.[27]

We set κ, the migration elasticity, to 2.8 in our baseline. In the context of China, Tombe and Zhu (2019) uses a migration elasticity of 1.5 at the individual level. Imbert et al. (2025), in a layered setting, estimates an elasticity of 2.72 to 4.2 between different modes of migration (whether to bring a dependent family member), conditional on migration. Our model captures both migration and different migration modes using a single parameter, so we set κ to 2.8, the midpoint between 1.5 and 4.2, and report the results for $\kappa = 2$ and $\kappa = 3.5$ in the appendix.

The rest of the parameters are internally calibrated. The subsistence consumption, $\bar{c}$, governs the speed of decline in agricultural employment. We start by assuming a value for $\bar{c}$ for 2000, calibrate the remaining parameters, then simulate the model forward, and finally adjust the value of $\bar{c}$ to match the 2020 share of households with both members in agriculture ($\alpha^o/(1-\alpha^u)$).

We now explain the calibration of parameters to match the data moments for the year 2000. The gender parameter ξ_u is calibrated to match the relative female-to-male wage ratio in the non-agricultural sector (0.84), ξ^h to match the employment rate of urban females relative to urban males (0.78), and θ to match the average urban employment rate (0.70). The parameter ξ_a is set to match the ratio of days worked in agriculture by female workers relative to male workers (0.93), based on data from the 2003 RFPS.[28]

We use ω, δ_f, and δ_s to match the share of households with both members working in agriculture ($\alpha^o/(1-\alpha^u) = 0.76$), the share of households with female working in

[27]The NBS began reporting hours only recently, with values ranging between 48 and 49 hours; see `https://data.stats.gov.cn/easyquery.htm?cn=A01&zb=A0E01&sj=202510`.

[28]The RFPS data report only the number of days spent on farm work, which we use to measure work intensity in agriculture in the model.

non-agriculture ($(\alpha^f + \alpha^b)/(\alpha^f + \alpha^m + \alpha^b) = 0.46$), and the share of split households ($(\alpha^f + \alpha^m)/(\alpha^f + \alpha^m + \alpha^b) = 0.63$).[29] A higher ω reduces their employment in non-agriculture. The exogenous labor market wedge μ is set to match the agricultural productivity gap (APG = 5.81), defined as the value added per worker in the non-agricultural sector relative to that of the agricultural sector.

With these parameters calibrated to match the year 2000, we then simulate the model at five-year intervals from 2005 to 2020. We allow δ_s and δ_f to vary over time, reflecting potential changes in social norms, as well as technological advancements that facilitate long-distance communication and reduce the dependence on female home production, for example, through household durables. We allow μ to change exogenously over time to capture other labor market wedges outside the scope of our model. Together, they allow the model to match APG, the share of households with the female working in non-agriculture ($(\alpha^f + \alpha^b)/(\alpha^f + \alpha^m + \alpha^b)$), and the share of split-households ($(\alpha^f + \alpha^m)/(\alpha^f + \alpha^m + \alpha^b)$). Since $\bar{c}$ matches the share of non-migrating households ($\alpha^o/(1 - \alpha^u)$) in 2020, the model reproduces exactly the employment patterns for 2020 and the relative employment shares in 2005, 2010, and 2015.

The *Reform* scenario represents the model's prediction using parameters reported in Table 4, Appendix Figure A2, and Table A7. The counterfactual *No-Reform* scenario differs only in that λ^b is fixed at its 2000 value. The reform impact is measured as the difference between these two scenarios.

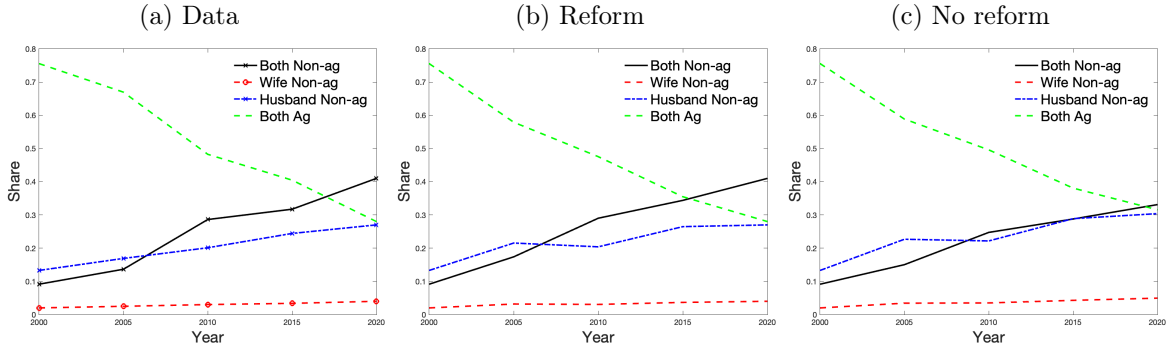
5.2 Uneven Impact of Land Reform

Figure 3 shows the effect on the employment pattern of households with agricultural *hukou*. Comparing panel (b) and panel (c), land reform has encouraged women to transition out of agriculture by increasing joint employment relative to male-only employment in non-agriculture. As summarized in Column (1) of Table 5, for agricultural *hukou* households, the share of male non-agricultural workers increases by 4.5 percentage points, calculated as the change in $(\alpha^m + \alpha^b)/(1 - \alpha^u)$ due to reform in 2020. The female non-agricultural employment share increases by 2.4 percentage points relative to that of males, calculated as the change in $(\alpha^f - \alpha^m)/(1 - \alpha^u)$. These estimates are in line with our regression results, which show that the reform increases

[29] Since the shares of different *hukou* types must satisfy Equation 3, and α^u is given exogenously, the three targeted moments pin down the shares of the four agricultural *hukou* household types.

male migration by about 3 percentage points (3*0.01 from column (1) in Table 1), and increases female migration relative to male migration by about 2.4 percentage points (3*0.008 from column (1) in Table 1).

Figure 3: Employment Pattern of Agricultural *Hukou* Households



Notes: This figure plots the employment pattern of households with agricultural *hukou*, represented by $\frac{\alpha^i}{1-\alpha^u}$, $i = o, f, m, b$, where the four shares sum up to one. The reform case is calibrated to match the data pattern in the 2000 and 2020 Census. The counterfactual exercise "No-reform" refers to the case in which the land policy parameter λ^b is fixed at its 2000 value, which is equal to 0.

Table 5: The Uneven Impact of Reform vs No Reform

	(1) Model Baseline	(2) Model No-guarding
Agricultural *hukou*		
Non-ag emp. share, male	+4.5 pp	+8.4 pp
Non-ag emp. share, female – male	+2.4 pp	−0.9 pp
Non-agricultural *hukou*		
Emp. rate, female – male	−3.3 pp	−1.5 pp
Wage ratio, female/male	−2.3 %	−1.1 %

Note: The results are based on the difference between the reform and no-reform scenarios in 2020. Column (1) reports the baseline calibration. Column (2) reports the case where the remaining member cannot guard the full share of land in the event of reallocation.

Role of Guard Labor We examine the role of "guard labor" in generating the uneven impact of land reform by considering a "no-guarding" case, where the remaining member can only keep their own land share in the event of reallocation. This case is

represented by setting

$$\lambda^b = p_n; \quad \lambda^f = \lambda^m = 0.5 + 0.5p_n, \tag{28}$$

where the values of $\lambda^b = p_n$ are reported in Table 4, based on the national average of the land reform index. Thus, the value of $\lambda_f = \lambda_m$ increases from 0.5 in 2000 to close to 1 in 2020.

We recalibrate this case following the same strategy, and the results are reported in column (2) of Table 5. Relative to the baseline, the reform generates a bigger reallocation of employment from agriculture to non-agriculture, because it increases both λ^b and $\lambda^f = \lambda^m$, while in the baseline it only increases λ^b. In contrast to the baseline, the reform shifts fewer women out of agriculture compared to men (by -0.9 percentage points), because land frictions do not hold women back in the first place.

In both the baseline and the "no-guarding" scenarios, women remain disproportionately in agriculture because the non-agricultural sector is less female-intensive ($\xi_u < \xi_a$), and when women exit agriculture, the production of non-market goods becomes less efficient ($\delta_s < 1$). In the baseline, having one household member remain in agriculture helps guard land income. Due to the sectoral gender intensities and women's role in home production, women naturally take on this role. In the absence of guard labor, this interaction disappears, and reform encourages more men to leave agriculture.

Urban Population The increase in female migrant workers relative to males due to land reform contributes to a larger relative supply of female workers in the non-agricultural sector, which lowers the female wage rate relative to that of males in non-agriculture. Urban households respond by decreasing the female employment rate relative to males and by increasing the share of females specializing in non-market production. The lower panel of Table 5 summarizes the model's prediction regarding this. Column (1) shows that the urban female employment rate decreases by 3.3 percentage points relative to men, and the gender wage ratio decreases by 2.3%. Empirically, the reform leads to a decrease of the relative female employment rate of 2.8 percentage points and a relative decline of the female annual income by 5 percent (Columns (1) and (2) in Table 3). The model's prediction of the wage income fall is smaller than the empirical findings.

It is worth noting that, under the no-guarding case, the large increase in female migrants (8.4 - 0.9 = 7.5 pp) still generates a decrease in the employment rate of urban women relative to men and a lower gender wage ratio because the wage ratio depends on the changes in the ratio of total female and male workers in the non-agricultural sector. However, the magnitude of the impact is much smaller compared to the baseline case.

Sensitivity Analysis The baseline model uses a migration elasticity of $\kappa = 2.8$. Appendix Table A8 reports results for two alternative cases, $\kappa = 2$ and $\kappa = 3.5$. Overall, a larger κ generates more migration and enlarges the differential impact by gender. In addition, our baseline calibration sets the elasticity of substitution between women and men to $\eta = 2$, close to the empirical estimate of 1.92 based on firm-level data from China (Ostry et al., 2018). At the macro-level, the degree of substitution could potentially differ. Appendix Table A9 presents the alternative cases where $\eta = 1.5$ and $\eta = 2.5$. A higher η implies that female and male workers are more substitutable. For rural households, greater substitutability makes it easier for women to stay behind and guard the land when there is no reform. As a result, the reform generates a larger differential impact across gender. For urban households, higher substitutability implies that the increase in the relative supply of female migrant workers has a smaller differential impact by gender.

5.3 Agricultural Productivity Gap

We now examine the impact of land reform on the agricultural productivity gap (APG) for the baseline case. The APG is calculated as the ratio of non-agricultural labor productivity relative to agricultural labor productivity, $(p_u y_u)/(p_a y_a)$, where y_u and y_a denote output per worker in the non-agricultural and agricultural sectors, respectively.[30] Figure 4 plots APG for the data/reform case and the no-reform case. By construction, the reform case matches the data exactly by varying the exogenous

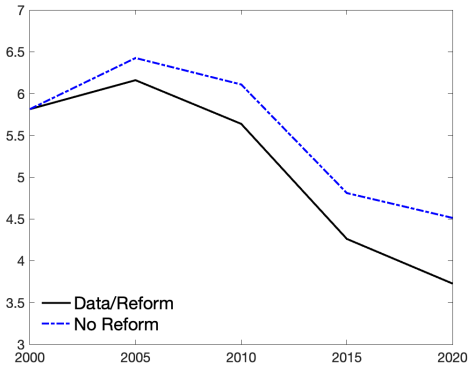
[30]The APG in the model is calculated as:

$$APG = \frac{p_u y_u}{p_a y_a} = \frac{p_u Y_u / \left(\alpha_f + \alpha_m + 2\alpha_b + \alpha_u E_f + \alpha_u E_m\right)}{p_a Y_a / \left(\mathbb{1}_m^f \alpha^f + \mathbb{1}_f^m \alpha^m + \mathbb{1}_f^o \alpha^o + \mathbb{1}_m^o \alpha^o\right)}$$

where $\mathbb{1}_g^i$ is an indicator of whether gender g in household type i works. Note that in the setup of our model, migrants always work.

labor market wedge μ. In the absence of reform, the APG would still decline due to the increase in μ shown in Appendix Figure A2 and sector-specific productivity growth (A_a, A_u). However, the decline would have been smaller (from 5.8 to 4.5 instead of 3.7). This implies that the reform alone can account for a 37% decline in APG from 2000 to 2020 $(= \frac{4.5-3.7}{5.8-3.7})$.

Figure 4: Agricultural Productivity Gap



Note: This figure plots APG for the data/reform case and the no-reform case, respectively. APG Data series are calculated using output and employment by sector from China Statistical Yearbook. The reform case matches the data exactly by varying the exogenous labor market wedge μ. The counterfactual No-Reform case differs only in that the land policy parameter λ^b is fixed at its 2000 value of 0.

We can further decompose the ratio of APG between the reform and no-reform scenarios in 2020 into differences in three components: agricultural labor productivity (y_a), non-agricultural labor productivity (y_u), and the relative price (p_u/p_a)[31]:

$$\ln\left(\frac{APG_{nr,\ 2020}}{APG_{r,\ 2020}}\right) = \ln\left(\frac{y_{a_{r,2020}}}{y_{a_{nr,2020}}}\right) + \ln\left(\frac{y_{u_{nr,2020}}}{y_{u_{r,2020}}}\right) + \ln\left(\frac{p_{u_{nr,2020}}}{p_{u_{r,2020}}}\right)$$
$$0.19 \quad = \quad 0.11 \quad + \quad 0.002 \quad + \quad 0.08$$

The reform increases agricultural labor productivity by 11% relative to the no-reform case, which accounts for 58% (=0.11/0.19) of the APG ratio. Two channels contribute to the higher agricultural labor productivity under reform. First, as workers leave the agricultural sector, the land-to-worker ratio increases. This increases the marginal return to agricultural work relative to non-market production. Hence, hours worked

[31] We normalize $p_a = 1$.

per worker are also higher under the reform than in the no-reform case. The land-to-worker ratio accounts for about 55% of the ratio in agricultural labor productivity y_a, while hours per worker account for the remaining 45%.[32] These findings are consistent with the empirical findings reported in Appendix Table A10, which uses household-level production data from RFPS to examine how land reforms affected agricultural labor productivity, farm size, and labor intensity.[33]

6 Conclusion

The unique features of China's *hukou* system and its subsequent land reforms allow us to identify and quantify the role of labor mobility barriers associated with land market frictions. By exploiting quasi-natural experiments resulting from land reforms, we find that seemingly gender neutral mobility barriers can act as gender-specific barriers in generating different labor market effects across gender. Using a model that focuses on employment decisions within households, we show that removing these labor mobility barriers is quantitatively important for the transition of women out of agriculture and the rise of joint migration relative to husband-only migration in developing countries. Our focus on land policy reforms echoes the broader consensus that land institutions and policies are critical for fostering resilient and equitable growth (World-Bank, 2024).

[32] Using the agricultural production function, the ratio of agricultural labor productivity is: $\ln\left(\frac{y_{a_{r,2000}}}{y_{a_{nr,2000}}}\right) = 0.5 * \ln\left(\frac{k_{a_{r,2020}}}{k_{a_{nr,2020}}}\right) + 0.5 * \ln\left(\frac{n_{a_{r,2020}}}{n_{a_{nr,2020}}}\right) \longrightarrow 0.11 = 0.5 * 0.12 + 0.5 * 0.10$, where k_a is land per worker and n_a is N_a divided by total workers. Hence, the land-to-worker ratio can explain 55% of the log ratio (=0.5*0.12/0.11).

[33] Appendix Table A10 reports that the reform increases agricultural labor productivity by 14.4% (=3*4.8% for a full reform, index increased from 0 to 3). Our model explains this through the increase in farm size and work intensity. Another channel could be improved land and labor allocation across farmers (Chari et al., 2021; Adamopoulos et al., 2022).

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Appendix

A1 Data

This section provides details on the data used in this paper.

A. Censuses and One Percent Population Surveys Our data on employment by sector and *hukou* status were obtained from the Chinese Population Censuses (1990, 2000, 2010, and 2020) and the One Percent Population Surveys (2005 and 2015). The microdata are nationally representative and offer detailed information on ethnicity, gender, age, employment status, occupation, industry, *hukou* type (rural agricultural or non-agricultural urban), current residence, marital status, and education across survey waves. We focus on the age group 18-55. As discussed in the text, Censuses 2015 and 2020 did not provide *hukou* type. We used whether an individual has rural land contracting rights to proxy for the de-facto *hukou* type.

For individuals reporting work status as employed, we group them into agricultural and non-agricultural sectors following the National Statistical Bureau's sectoral classification system. For the individual-level regression on sectoral employment of agricultural-*hukou* holders (Online Appendix Table A1), we compile several control variables for ethnic minority status, age, marital status, and high skill (education at college and above). Summary statistics for these variables are reported in Online Appendix Table B1.

B. Chinese Household Income Project (CHIP) We use both rural and urban samples from six waves of the nationally representative CHIP surveys conducted between 1995 and 2018. Married households are defined as couples aged 18 to 55 and include various family structures, such as intergenerational arrangements. In the rural household questionnaires, respondents are also asked about time spent away from the household or hometown. Those who indicate ">= 6 months (180 days)" are classified as migrants. Although the wording varies slightly across survey waves, the core objective remains the same. This classification allows for meaningful comparisons across households and over time.

The urban resident sample follows the same age and employment criteria as the rural sample and is used to assess how external land reform in migration-origin coun-

ties affects the urban labor market, particularly employment and wage outcomes for the urban population. Specifically, we select urban residents aged 18–55 who were not in school at the time of the survey and were healthy enough to work. Summary statistics for the relevant variables are presented in Online Appendix Table B2.

C. Rural Fixed Point Survey (RFPS) This is a longitudinal panel survey conducted by the Research Center of Rural Economy of the Chinese Ministry of Agriculture, providing micro-level data on rural household agricultural production. Initiated in 1986, the RFPS tracks a nationally representative sample of approximately 20,000 rural households across 300 villages in all 31 Chinese provinces.

These villages were carefully selected to ensure representativeness across region, income, cropping patterns, population, and non-farm activities. Within each village, households were drawn by random sampling. Renowned for its data quality, RFPS has been used in influential studies such as Chari et al. (2021) and Adamopoulos et al. (2024). Our study uses RFPS data from 2003 to 2017 to examine how land reform affects rural residents' migration, sectoral employment, and intra-household migration pattern. Online Appendix Table B3 presents the summary statistics for the variables used in our analysis.

D. China Family Panel Studies (CFPS) A biennial longitudinal survey conducted by the Institute of Social Science Survey (ISSS) at Peking University. Launched in 2010, CFPS tracks a nationally representative sample of about 19,237 individuals from 8,582 households across 1,004 counties. The surveys span from 2010 to 2020, covering both rural and urban populations. In our analysis, we use CFPS data to test the robustness of our empirical results for the rural resident sample.

Using six waves of CFPS, we construct an individual panel for rural agricultural residents, detailing migration, employment, and income. The panel structure allows for two-way fixed effects estimation, controlling for unobserved, time-invariant individual heterogeneity and time-specific shocks. Summary statistics for the rural CFPS sample are reported in Online Appendix Table B4.

A2 Model Derivations

This section derives the household consumption and employment decisions, taking wage rates and prices as given.

A2.1 Consumption Choices

The utility function implies the relative consumption:

$$\frac{\omega}{1-\omega} = \frac{p_a}{p_u}\frac{c_a^i - \bar{c}}{c_u^i}, \quad i = f, m, b, o, u \tag{29}$$

Together with the budget constraint, the consumption decisions are:

$$c_a^i - \bar{c} = \frac{\omega\left(I^i - p_a\bar{c}\right)}{p_a}; \qquad c_u^i = \frac{(1-\omega)\left(I^i - p_a\bar{c}\right)}{p_u}, \tag{30}$$

which are independent of hours allocation. The utility achieved from consumption and non-market goods becomes:

$$\ln\left[\left(c_a^i - \bar{c}\right)^{\omega}\left(c_u^i\right)^{(1-\omega)}\right] + \theta \ln H^i = \ln B + \ln(I^i - p_a\bar{c}) + \theta \ln H^i \tag{31}$$

where the first term, $B = \left(\frac{\omega}{p_a}\right)^{\omega}\left(\frac{1-\omega}{p_u}\right)^{1-\omega}$ is the same for all households.

A2.2 Agricultural *Hukou* Households

Rural households solve the utility maximization problem for each of the four choices $i = o, f, m, b$ and select the one that yields the highest utility. They take wage rates (w_{fa}, w_{ma}, w_{fu}, and w_{mu}), land income (I_k), and its allocation rules (λ_i) as given.

Type o Households Home hours h_g^o are always positive. A corner solution arises when one member's marginal utility from h_g^o exceeds that of work hours n_g^o, even when n_g^o approaches 0. Subject to the time constraint (Equation 11), a type o household solves:

$$\max_{n_g^o, h_g^o} U^o = \ln B + \ln\left[w_{fa}n_f^o + w_{ma}n_m^o + \lambda^o I_k - p_a\bar{c}\right] + \theta \ln\left[\left(h_f^o\right)^{\xi_h}\left(h_m^o\right)^{1-\xi_h}\right] + \ln\epsilon^o$$

The first order conditions for interior solutions h_f^o and h_m^o are given by:

$$\frac{w_{fa}}{w_{fa}n_f^o + w_{ma}n_m^o + \lambda^o I_k - p_a\bar{c}} = \frac{\theta\xi_h}{h_f^o} \tag{32}$$

$$\frac{w_{ma}}{w_{fa}n_f^o + w_{ma}n_m^o + \lambda^o I_k - p_a\bar{c}} = \frac{\theta\left(1-\xi_h\right)}{h_m^o} \tag{33}$$

They imply the following relative home hours:

$$\frac{w_{fa}}{w_{ma}}\frac{1-\xi_h}{\xi_h} = \frac{h_m^o}{h_f^o} \tag{34}$$

Using Equation 11, Equation 32 and Equation 34, we obtain a closed-form solution for h_f^o:

$$h_f^o = \frac{\theta\xi_h}{1+\theta}\frac{w_{fa} + w_{ma} + \lambda^o I_k - p_a\bar{c}}{w_{fa}} \tag{35}$$

Knowing h_f^o, Equation 34 solves h_m^o.

Type f Households Subject to the time constraint (Equation 11), a type f household solves:

$$\max_{n_g^f, h_g^f} U^f = \ln B + \ln\left[\mu w_{fu}n_f^f + w_{ma}n_m^f + \lambda^f I_k - p_a\bar{c}\right] + \theta\ln\left[\delta_f\delta_s\left(h_f^f\right)^{\xi_h}\left(h_m^f\right)^{1-\xi_h}\right] + \ln\epsilon^f$$

where the female member in non-agriculture works fixed hours $n_f^f = \bar{n}, h_f^f = 1-\bar{n}$.

The first order condition for the hours choice of the male member is given by:

$$\frac{w_{ma}}{\mu w_{fu}\bar{n} + w_{ma}n_m^f + \lambda^f I_k - p_a\bar{c}} = \frac{\theta\left(1-\xi_h\right)}{h_m^f} \tag{36}$$

Together with $n_m^f + h_m^f = 1$, we get an explicit solution for h_m^f:

$$h_m^f = \frac{\theta(1-\xi_h)}{\theta(1-\xi_h)+1}\frac{\mu w_{fu}\bar{n} + w_{ma} + \lambda^f I_k - p_a\bar{c}}{w_{ma}} \tag{37}$$

If $h_m^f > 1$, we have the corner solution $h_m^f = 1$.

Type m Households Subject to the time constraint (Equation 11), type m solves:

$$\max_{n_g^m, h_g^m} U^m = \ln B + \ln\left[w_{fa} n_f^m + \mu w_{mu} n_m^m + \lambda^m I_k - p_a \bar{c}\right] + \theta \ln\left[\delta_s \left(h_f^m\right)^{\xi_h} \left(h_m^m\right)^{1-\xi_h}\right] + \ln \epsilon^m,$$

where the male member working in non-agriculture has fixed hours $n_m^m = \bar{n}, h_m^m = 1 - \bar{n}$.

The first order condition of female hours is given by:

$$\frac{w_{fa}}{w_{fa} n_f^m + \mu w_{mu} \bar{n} + \lambda^m I_k - p_a \bar{c}} = \frac{\theta \xi_h}{h_f^m} \tag{38}$$

Together with Equation 11, we obtain:

$$h_f^m = \frac{\theta \xi_h}{\theta \xi_h + 1} \frac{w_{fa} + \mu w_{mu} \bar{n} + \lambda^m I_k - p_a \bar{c}}{w_{fa}} \tag{39}$$

If $h_f^m > 1$, we obtain the corner solution $h_f^m = 1$.

Type b Households When both members are working in non-agriculture, they do not choose hours and their utility and hours are given by:

$$U^b = \ln\left[\mu w_{fu} n_f^b + \mu w_{mu} n_f^b + \lambda^b I_k - p_a \bar{c}\right] + \theta \ln\left[\left(h_f^b\right)^{\xi_h} \left(h_m^b\right)^{1-\xi_h}\right] + \ln \epsilon^b \tag{40}$$

$$n_f^b = n_m^b = \bar{n}; \quad h_f^b = h_m^b = 1 - \bar{n}. \tag{41}$$

Choice Among the Four Types Knowing the hours decisions, we can calculate the maximum utility U^i conditional on the sectoral employment decision i. Households then choose the sector i that generates the highest utility.

Since we assume that ϵ^o, ϵ^f, ϵ^m, and ϵ^b are independently drawn from the Fréchet distribution with CDF $e^{-\epsilon^{-\kappa}}$ and PDF $\kappa \epsilon^{-1-\kappa} e^{-\epsilon^{-\kappa}}$, with the definition of V^i from Equation 26, we can calculate α^o as:

$$\begin{aligned}
\alpha^o &= (1 - \alpha^u) \int_0^\infty Pr\left(V^f \epsilon^f < V^o \epsilon^o\right) Pr\left(V^m \epsilon^m < V^o \epsilon^o\right) Pr\left(V^b \epsilon^b < V^o \epsilon^o\right) f(\epsilon^o) d\epsilon^o \\
&= (1 - \alpha^u) \int_0^\infty e^{-\left(\frac{V^o}{V^f}\epsilon\right)^{-\kappa}} e^{-\left(\frac{V^o}{V^m}\epsilon\right)^{-\kappa}} e^{-\left(\frac{V^o}{V^b}\epsilon\right)^{-\kappa}} \kappa \epsilon^{-1-\kappa} e^{-\epsilon^{-\kappa}} d\epsilon \\
&= (1 - \alpha^u) \frac{(V^o)^\kappa}{(V^f)^\kappa + (V^m)^\kappa + (V^b)^\kappa + (V^o)^\kappa}
\end{aligned}$$

In general, we have

$$\alpha^i = (1-\alpha^u)\frac{(V^i)^\kappa}{(V^f)^\kappa + (V^m)^\kappa + (V^b)^\kappa + (V^o)^\kappa}. \tag{42}$$

A2.3 Non-agricultural Hukou Households

Given the time constraint (Equation 11), the representative household head solves

$$\max_{E_f^u, E_m^u} \quad U^u = \ln B + \ln\left[w_{fu}\bar{n}E_f^u + w_{mu}\bar{n}E_m^u - p_a\bar{c}\right] + \theta \ln\left[\left(h_f^u\right)^{\xi_h}\left(h_m^u\right)^{1-\xi_h}\right] \tag{43}$$

where E_f^u and E_m^u denote urban female and male employment rates. The household head chooses the optimal E_f^u and E_m^u. The corresponding FOCs are given by:

$$\frac{w_{fu}}{w_{fu}\bar{n}E_f^u + w_{mu}\bar{n}E_m^u - p_a\bar{c}} = \frac{\theta\xi_h}{h_f^u} \tag{44}$$

$$\frac{w_{mu}}{w_{fu}\bar{n}E_f^u + w_{mu}\bar{n}E_m^u - p_a\bar{c}} = \frac{\theta\left(1-\xi_h\right)}{h_m^u} \tag{45}$$

This implies a relative relationship between h_f^u and h_m^u:

$$\frac{w_{fu}}{w_{mu}} = \frac{\xi_h}{1-\xi_h}\frac{h_m^u}{h_f^u} \tag{46}$$

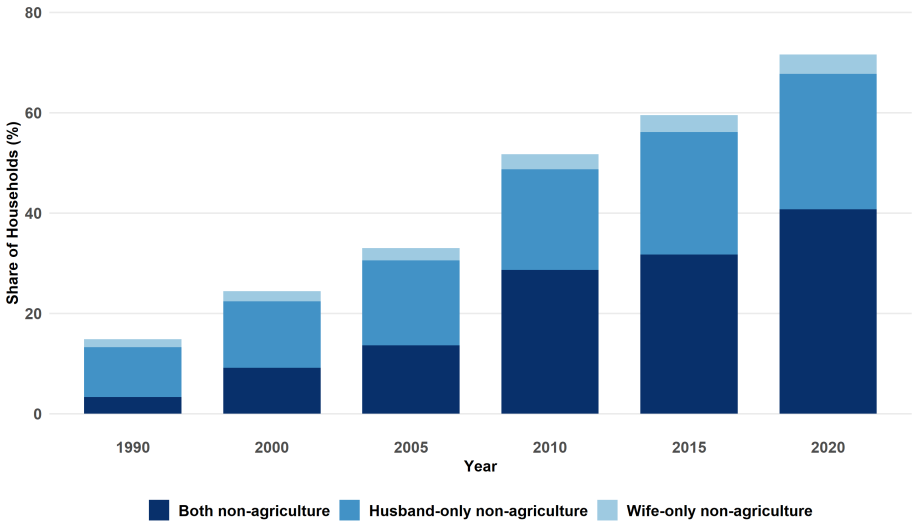
Together with the household time constraint, we get:

$$h_f^u = \frac{\theta\xi_h}{1+\theta}\frac{w_{fu} + w_{mu} - p_a\bar{c}}{w_{fu}} \tag{47}$$

Knowing h_f^u, we can easily solve for h_m^u, and hence E_f and E_m.

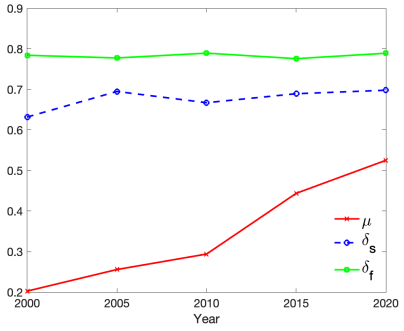
A3 Appendix Figures and Tables

Figure A1: Employment Pattern of Rural Married Couples



Notes: Census and one percent population survey. Pairs of rural husbands and wives aged 18–55 by sectoral employment. "Both non-agriculture" denotes that both the husband and wife are employed in non-agricultural sectors. "Husband-only non-agriculture" denotes that husbands work in non-agriculture and wives do not. "Wife-only non-agriculture" denotes that wives work in non-agriculture while husbands do not.

Figure A2: Baseline Time-varying Parameters



Note: This figure displays time-varying parameters for the exogenous labor market wedge μ, the efficiency of non-market production when women work in the non-agricultural sector δ_f, as well as the efficiency of non-market production when couples split into different sectors δ_s.

Table A1: Non-agricultural Employment of Agricultural-hukou Holders

Dependent Variable	Non-Agricultural Employment
Female	-0.101***
	(0.006)
Individual Controls	Yes
Province Fixed Effects	Yes
Year Fixed Effects	Yes
# of Obs	13,140,026
adj. R-sq	0.201

Notes: This table is based on individual-level regression to examine the gender difference in non-agricultural employment. Controls include minority status, age, age squared, marital status, and a high skill indicator (education at the college level and above). Source: Census and One Percent Population Survey for 1990, 2000, 2005, 2010, 2015, and 2020. Sample: agricultural-*hukou* holders (aged 18–55). Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.

Table A2: Impact of Pre-Reform Land Insecurity on Labor Reallocation

	Rural Household (1995-2006)		Individual (2003-2006)			
	Non-farm	Migration	Non-farm		Migration	
	(1)	(2)	(3)	(4)	(5)	(6)
Land Redistribution	-0.008**	-0.024**	-0.014**	0.006	-0.035**	0.010
	(0.004)	(0.010)	(0.006)	(0.004)	(0.017)	(0.018)
Land Redistribution*Female				-0.021**		-0.048**
				(0.010)		(0.023)
Household/Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308345	308345	125720	125720	125720	125720

Notes: Rural Fixed Point Survey 1995–2006. Columns (1) and (2) use the household sample for 1995–2006, while columns (3) to (6) use the individual sample (aged 18–55) for 2003–2006. Dependent variables: Column (1) is a dummy equal to 1 if any household member spent any labor days in non-farm employment during a year; Column (2) is a dummy equal to 1 if any household member spent any labor days in out-migration work during a year. Columns (3)–(4) are dummies equal to 1 if the surveyed individual spent any labor days in non-farm employment during a year; Columns (5)–(6) are dummies equal to 1 if the surveyed individual spent any labor days in out-migration work during a year. Land redistribution is defined as the reallocation of more than 30% of village land by village cadres, as recalled for the period from the 1970s through 2006, and sourced from a special one-off supplementary survey on village governance conducted by RFPS in 2006. Columns 1 to 2 control for household individual fixed effects and year fixed effects. Columns 3 to 6 control for individual fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

Table A3: Balance Tests

	Land Reform Index						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Per Capita	0.016	-0.183	-0.255	0.182	-0.074	-0.203	-0.089
	(0.047)	(0.228)	(0.289)	(0.170)	(0.126)	(0.228)	(0.121)
GDP Growth Rate	-0.065	0.011	0.004	0.062	-0.042	-0.086	0.044
	(0.037)	(0.057)	(0.057)	(0.136)	(0.065)	(0.065)	(0.060)
Population Size	-0.237	0.309	0.329	0.413*	1.079**	1.274**	0.274
	(0.162)	(0.220)	(0.221)	(0.186)	(0.393)	(0.387)	(0.254)
Rural Resident Average Income		-0.079*	-0.087*	-0.203	0.226**	-0.089*	-0.090**
		(0.034)	(0.035)	(0.228)	(0.086)	(0.041)	(0.034)
Manufacture Sector Share			-0.179	-0.314	0.200	-0.303	-0.178
			(0.166)	(0.451)	(0.414)	(0.278)	(0.176)
Revenue Per Capita				0.022			
				(0.080)			
Rural Population with New Rural Pension				-0.006			
				(0.007)			
Rural Population with New Rural Medical Scheme				-0.039			
				(0.051)			
Number of Cellphone Users					0.032		
					(0.023)		
Number of Internet Users					-0.018		
					(0.027)		
Connect to the National Highway						-0.173	
						(0.211)	
Rural Out-migrant Share							0.094
							(0.063)
Observations	14501	5508	5470	938	1374	2978	5025

Notes: This table presents a regression of the county-level land reform index (2010–2019) on a set of socio-economic indicators that may be correlated with out-migration of agricultural *hukou* holders, verifying that the spatial diffusion of the land reform was independent of these factors. Standard errors clustered at the county level in parentheses; * p<0.05, ** p<0.01, *** p<0.001.

Table A4: Impact of Reforms on Rural Households' Rental Activities

	Rural Household Sample, RFPS (1995–2017)		
Dependent Variables	Rental Out (=1)	Rental Area (Logged)	Rental Income (Logged)
	(1)	(2)	(3)
Land Reform Index	0.100***	0.129**	0.097**
	(0.028)	(0.050)	(0.047)
Control Variables	Yes	Yes	Yes
Household FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	78016	78016	78016

Notes: Rural Fixed Point Surveys 1995–2017. The dependent variables are at the household-level and include: 1) a dummy variable for renting out land that year; 2) the size of land rented out; and 3) the income from renting out land. All specifications control for household fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

Table A5: Impact of Individual Reforms on Rural Individuals' Employment and Migration Outcomes, by Gender

	Rural Individual Sample RFPS (2003–2017)	
Dependent Variables	Non-farm employment (=1)	Migration (=1)
	(1)	(2)
Land Contracting Reform (Provincial)	-0.000	0.011*
	(0.010)	(0.007)
Land Contracting Reform (Prefecture/County)	0.023	0.009
	(0.014)	(0.010)
Land Titling Reform	0.023	0.035**
	(0.017)	(0.014)
Land Contracting Reform (Provincial) * Female	0.003	-0.005
	(0.007)	(0.005)
Land Contracting Reform (Prefecture/County) * Female	0.019*	0.018**
	(0.010)	(0.008)
Land Titling Reform * Female	0.021*	0.017**
	(0.012)	(0.008)
Control Variables	Yes	Yes
Individual FE	Yes	Yes
Year FE	Yes	Yes
Observations	356933	356933

Notes: Rural Fixed Point Survey 2003–2017, aged 18–55. The dependent variable in columns 1 to 2 are: a dummy variable equal to one if the surveyed individual devoted any labor days to non-farm employment during a year, and a dummy variable equal to one if the surveyed individual devoted any labor days to out-migration work during a year. This table uses three dummy variables for provincial land contracting reform, prefecture/county land contracting reform, and land titling reform with the specification in Table 1. 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), shares of manufacturing and tertiary industries, and population size (logged). Policy control variables include the weighted non-land-related *hukou* reform indices (Gai et al., 2025), along with a dummy variable indicating whether a county adopted the New Rural Pension Reform. All specifications control for individual fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table A6: Impact of Reforms on Rural Individuals' Employment and Migration, by Gender and Marital Status

Dependent Variables	Rural Individual Sample RFPS (2003–2017)	
	Non-farm (=1)	Migration (=1)
	(1)	(2)
Land Reform	0.009*	0.009**
	(0.005)	(0.004)
Land Reform * Married Female	0.007**	0.008***
	(0.004)	(0.003)
Land Reform * Unmarried Male	0.003	0.002
	(0.005)	(0.005)
Land Reform * Unmarried Female	0.013**	0.004
	(0.007)	(0.005)
Control Variables	Yes	Yes
Individual FE	Yes	Yes
Year FE	Yes	Yes
Observations	358949	358949

Notes: RFPS 2003–17, aged 18–55. The dependent variable in column 1: a dummy variable equal to one if the surveyed individual devoted any labor days to non-farm employment during a year, while that in column 2: a dummy variable equal to one if the surveyed individual devoted any labor days to out-migration work during a year. 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), shares of manufacturing and tertiary industries, and population size (logged). Policy control variables include the weighted non-land-related *hukou* reforms (Gai et al., 2025), along with a dummy variable indicating whether a county adopted the New Rural Pension Reform. All specifications control for individual fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table A7: Baseline Parameters

Para.	Values	Targets
Directly calibrated parameters		
α_u	0.27	Non-agricultural hukou share (Census)
g_u	6.61%	Labor productivity growth based on employment and real GDP (CSY)
η	2	Ngai and Petrongolo (2017)
$\bar{n}$	0.49	48.5 hours per week (NBS)
β	0.50	Land share from Cao and Birchenall (2013)
κ	2.80	Tombe and Zhu (2019) and Imbert et al. (2025)
Internally calibrated parameters to match 2000		
ξ_u	0.40	Female over male wage rate in non-agriculture (UHS)
ξ_h	0.49	Female over male employment rate; non-ag hukou (UHS)
θ	2.23	Employment rate; non-agricultural hukou holders (UHS)
ξ_a	0.50	Agricultural days per worker, female over male (RFPS 2003)
ω	0.05	Share of households with both members in agriculture (Census)
μ	0.20	Agricultural productivity gap (CSY)
δ_f	0.78	Share of households with female in non-agriculture (Census)
δ_s	0.63	Share of split households (Census)
Time varying to match 2005, 2010, 2015, and 2020		
μ	varying	Agricultural productivity gap (Census)
δ_f	varying	Share of households with female in non-agriculture (Census)
δ_s	varying	Share of split households (Census)
Internally calibrated parameters to match 2020		
g_a	4.68%	Labor productivity growth based on employment and real GDP (CSY)
$\bar{c}$	0.40	Share of households with both members in agriculture (Census)

Note: This table reports the baseline parameters. The implied value of $\frac{\bar{c}}{Y_a}$ is 0.90 in 2020. Parameter values are rounded to two digits. See Figure A2 for the values of time-varying parameters.

Table A8: The Role of Migration Elasticity

	(1) $\kappa = 2$	(2) Baseline $\kappa = 2.8$	(3) $\kappa = 3.5$
Agricultural *hukou*			
Non-ag emp. share, male	+4.1 pp	+4.5 pp	+4.8 pp
Non-ag emp. share, female – male	+0.9 pp	+2.4 pp	+3.7 pp
Non-agricultural *hukou*			
Emp. rate, female – male	−1.8 pp	−3.3 pp	−4.5 pp
Wage ratio, female/male	−1.3 %	−2.3 %	−3.2 %

Note: The baseline is column 1 of Table 5. The results are based on the difference between the reform and no-reform scenarios in 2020. For each κ value, we recalibrate the model following the same calibration strategy described in subsection 5.1.

Table A9: The Role of the Elasticity of Substitution Between Women and men

	(1) $\eta = 1.5$	(2) Baseline $\eta = 2$	(3) $\eta = 2.5$
Agricultural *hukou*			
Non-ag emp. share, male	+4.6 pp	+4.5 pp	+4.5 pp
Non-ag emp. share, female – male	+2.3 pp	+2.4 pp	+2.5 pp
Non-agricultural *hukou*			
Employment rate, female – male	−3.9 pp	−3.3pp	−2.8 pp
Wage ratio, female/male	−2.8 %	−2.3 %	−2.0 %

Note: The baseline is column 1 of Table 5. The results are based on the difference between the reform and no-reform scenarios in 2020. For each η value, we recalibrate the model following the same calibration strategy described in subsection 5.1.

Table A10: Impact of Reforms on Agricultural Households' Labor Productivity, Farm Size, and Labor Days

	Labor Productivity	Land per worker	Labor Days per Worker
	(1)	(2)	(3)
Land Reform	0.048**	0.020**	0.038**
	(0.021)	(0.010)	(0.018)
Control Varaibles	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	139322	139322	139322

Notes: RFPS 2003–2017, households with agricultural *hukou*. The dependent variables in columns 1–3 are: 1) labor productivity measured as total value of agricultural output divided by the number of agricultural workers in the household, 2) farming area per worker, and 3) total labor days per worker in a year. Household control variables include the share of male agricultural labor and dependency rate. Economic control variables include county and village GDP per capita (logged), shares of manufacturing and tertiary industries, and population size (logged). Policy control variables include the weighted non-land-related *hukou* reform indices (Gai et al., 2025), along with a dummy variable indicating whether a county adopted the New Rural Pension Reform. All specifications control for household fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Online Appendix–Not For Publication

B1 Recent Changes in China's *Hukou* System

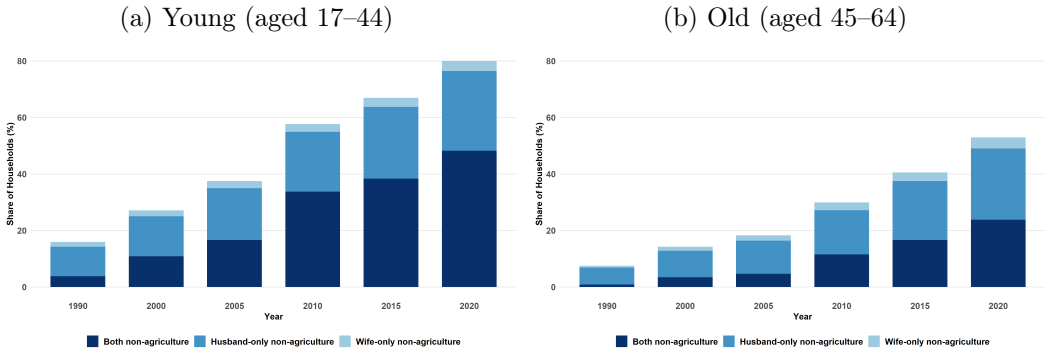
This section summarizes recent changes in the *hukou* system based on the comprehensive reviews by Chan (2019). Since the early 2000s, several cities across 11 provinces have eliminated the agricultural and non-agricultural *hukou* classifications. Residents in these areas now typically hold a unified *hukou* type, labeled "jumin hukou." In some cases, former agricultural *hukou* holders were given the option to give up their land in exchange for urban social security benefits, such as old-age pensions. For those who retained their land, the *hukou* relabeling is largely symbolic, yielding few meaningful changes in the benefits they receive.

The National New-Type Urbanization Plan, announced in 2014, set a target of granting urban registration to 100 million people by 2020. While priority was given to skilled workers and long-term migrants, many current and former farmers were also included. In July 2014, the State Council issued the *Opinions on Hukou Reform*, detailing measures to merge agricultural and non-agricultural *hukou* into a unified hukou type—reforms that several localities had already begun experimenting with as early as 2007 (e.g., Chongqing Municipality in 2007, Chengdu Prefecture in 2010). Following the Opinions, each province issued its own implementation guidelines over the next two years. However, because hukou registration remains tied to one's registered place of residence at birth, this reform had limited impact on migrants' access to urban public services unless they can change their registration address. More importantly, the reform did not affect the land tenure system: rural farmland remains collectively owned and is allocated to pre-2014 agricultural *hukou* holders with no substantial changes to their land rights.

In summary, while these reforms represented some institutional adjustments, they did not fundamentally alter the *hukou* system or eliminate the rural–urban divide, especially with respect to rural land property rights. Note that following the 2014 reform, the 2015 and 2020 censuses ceased reporting individuals' *hukou* type. We instead use whether an individual holds rural land tenure rights as a proxy for de-facto *hukou* type. In the 2015 data, 62% of the respondents had land rights, indicating that *hukou* unification did not substantially change the underlying land use rights for the former agricultural-*hukou* population.

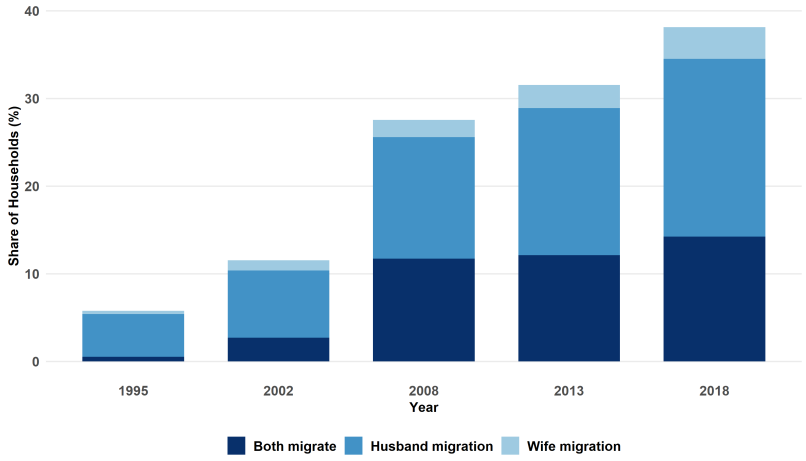
B2 Additional Figures and Tables

Figure B1: Employment Pattern of Rural Married Households by Age Groups



Notes: Census and one percent population survey. Pairs of rural husbands and wives aged 17–44 (young) in Panel A and 45–64 (old) in Panel B. "Both non-agriculture" denotes that both the husband and wife are employed in non-agricultural sectors. "Husband-only non-agriculture" denotes that husbands work in non-agriculture and wives do not. "Wife-only non-agriculture" denotes that wives work in non-agriculture while husbands do not.

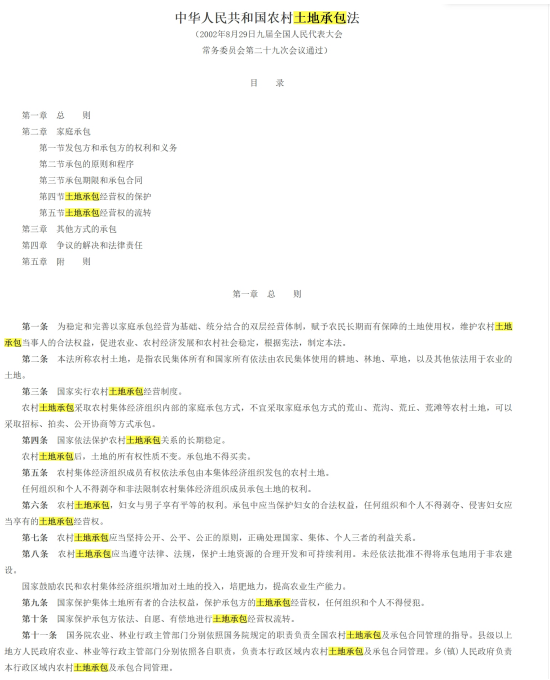
Figure B2: Migration Pattern of Rural Married Couples



Notes: CHIP. Pairs of rural husbands and wives aged 18–55 by migration mode: both spouses migrate, only the husband migrates, and only the wife migrates. Migrants: if an individual answers ≥ 6 months (180 days) to "How many days did you work away (live/work outside) from the household (your hometown)?"

Figure B3: Examples of Land Reform Policy Documents at Different Levels

(a) Central government document



中华人民共和国农村土地承包法

（2002年8月29日九届全国人民代表大会常务委员会第二十九次会议通过）

目　录

第一章　总　　则

第一条　为稳定和完善以家庭承包经营为基础、统分结合的双层经营体制，赋予农民长期而有保障的土地使用权，维护农村土地承包当事人的合法权益，促进农业、农村经济发展和农村社会稳定，根据宪法，制定本法。

第二条　本法所称农村土地，是指农民集体所有和国家所有依法由农民集体使用的耕地、林地、草地，以及其他依法用于农业的土地。

第三条　国家实行农村土地承包经营制度。

农村土地承包采取农村集体经济组织内部的家庭承包方式，不宜采取家庭承包方式的荒山、荒沟、荒丘、荒滩等农村土地，可以采取招标、拍卖、公开协商等方式承包。

第四条　国家依法保护农村土地承包关系的长期稳定。

农村土地承包后，土地的所有权性质不变。承包地不得买卖。

第五条　农村集体经济组织成员有权依法承包由本集体经济组织发包的农村土地。

任何组织和个人不得剥夺和非法限制农村集体经济组织成员承包土地的权利。

第六条　农村土地承包，妇女与男子享有平等的权利。承包中应当保护妇女的合法权益，任何组织和个人不得剥夺、侵害妇女应当享有的土地承包经营权。

第七条　农村土地承包应当坚持公开、公平、公正的原则，正确处理国家、集体、个人三者的利益关系。

第八条　农村土地承包应当遵守法律、法规，保护土地资源的合理开发和可持续利用。未经依法批准不得将承包地用于非农建设。

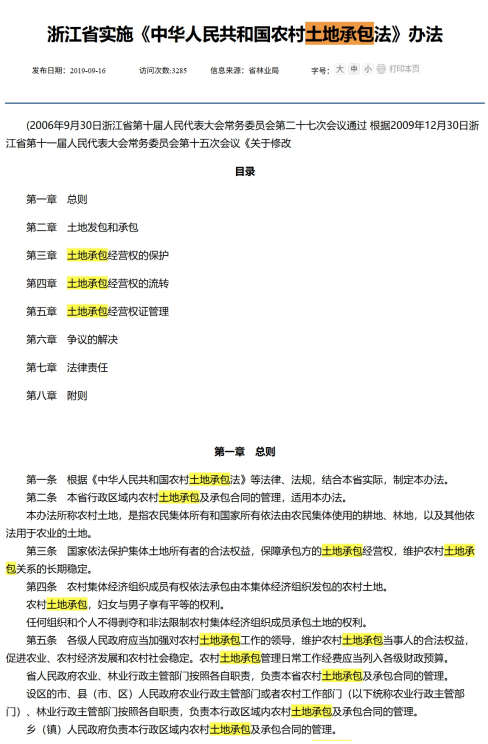
国家鼓励农民和农村集体经济组织增加对土地的投入，培肥地力，提高农业生产能力。

第九条　国家保护集体土地所有者的合法权益，保护承包方的土地承包经营权，任何组织和个人不得侵犯。

第十条　国家保护承包方依法、自愿、有偿地进行土地承包经营权流转。

第十一条　国务院农业、林业行政主管部门分别依照国务院规定的职责负责全国农村土地承包及承包合同管理的指导。县级以上地方人民政府农业、林业等行政主管部门分别依照各自职责，负责本行政区域内农村土地承包及承包合同管理。乡（镇）人民政府负责本行政区域内农村土地承包及承包合同管理。

(b) *Zhejiang* province document



浙江省实施《中华人民共和国农村土地承包法》办法

发布日期：2019-09-16　　访问次数:3285　　信息来源：省林业局　　字号：大 中 小 打印本页

(2006年9月30日浙江省第十届人民代表大会常务委员会第二十七次会议通过 根据2009年12月30日浙江省第十一届人民代表大会常务委员会第十五次会议《关于修改

目录

第一章　总则

第一条　根据《中华人民共和国农村土地承包法》等法律、法规，结合本省实际，制定本办法。

第二条　本省行政区域内农村土地承包及承包合同的管理，适用本办法。

本办法所称农村土地，是指农民集体所有和国家所有依法由农民集体使用的耕地、林地，以及其他依法用于农业的土地。

第三条　国家依法保护集体土地所有者的合法权益，保障承包方的土地承包经营权，维护农村土地承包关系的长期稳定。

第四条　农村集体经济组织成员有权依法承包由本集体经济组织发包的农村土地。

农村土地承包，妇女与男子享有平等的权利。

任何组织和个人不得剥夺和非法限制农村集体经济组织成员承包土地的权利。

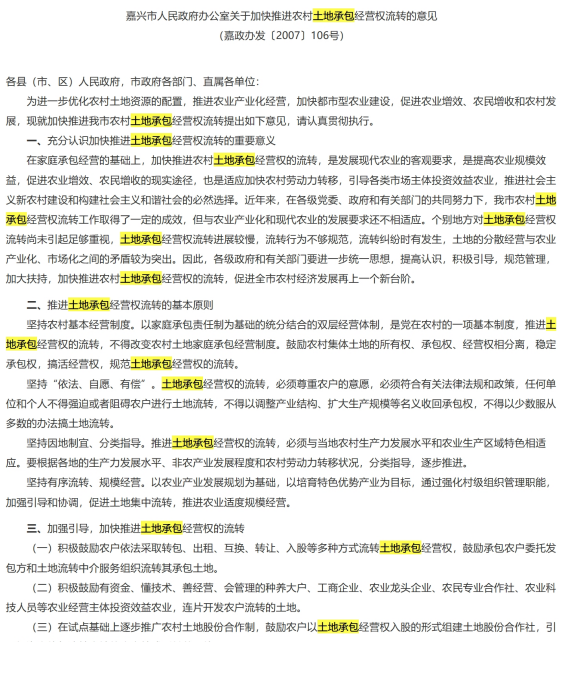
第五条　各级人民政府应当加强对农村土地承包工作的领导，维护农村土地承包当事人的合法权益，促进农业、农村经济发展和农村社会稳定。农村土地承包管理日常工作经费应当列入各级财政预算。

省人民政府农业、林业行政主管部门按照各自职责，负责本省农村土地承包及承包合同的管理。

设区的市、县（市、区）人民政府农业行政主管部门或者农村工作部门（以下统称农业行政主管部门）、林业行政主管部门按照各自职责，负责本行政区域内农村土地承包及承包合同的管理。

乡（镇）人民政府负责本行政区域内农村土地承包及承包合同的管理。

(c) *Jiaxing* Prefecture document



嘉兴市人民政府办公室关于加快推进农村土地承包经营权流转的意见

（嘉政办发〔2007〕106号）

各县（市、区）人民政府，市政府各部门、直属各单位：

为进一步优化农村土地资源的配置，推进农业产业化经营，加快都市型农业建设，促进农业增效、农民增收和农村发展，现就加快推进我市农村土地承包经营权流转提出如下意见，请认真贯彻执行。

一、充分认识加快推进土地承包经营权流转的重要意义

在家庭承包经营的基础上，加快推进农村土地承包经营权的流转，是发展现代农业的客观要求，是提高农业规模效益，促进农业增效、农民增收的现实途径，也是适应加快农村劳动力转移，引导各类市场主体投资效益农业，推进社会主义新农村建设和构建社会主义和谐社会的必然选择。近年来，在各级党委、政府和有关部门的共同努力下，我市农村土地承包经营权流转工作取得了一定的成效，但与农业产业化和现代农业的发展要求还不相适应。个别地方对土地承包经营权流转尚未引起足够重视，土地承包经营权流转进展较慢，流转行为不够规范，流转纠纷时有发生，土地的分散经营与农业产业化、市场化之间的矛盾较为突出。因此，各级政府和有关部门要进一步统一思想，提高认识，积极引导，规范管理，加大扶持，加快推进农村土地承包经营权的流转，促进全市农村经济发展再上一个新台阶。

二、推进土地承包经营权流转的基本原则

坚持农村基本经营制度。以家庭承包责任制为基础的统分结合的双层经营体制，是党在农村的一项基本制度，推进土地承包经营权的流转，不得改变农村土地家庭承包经营制度。鼓励农村集体土地的所有权、承包权、经营权相分离，稳定承包权，搞活经营权，规范土地承包经营权的流转。

坚持“依法、自愿、有偿”。土地承包经营权的流转，必须尊重农户的意愿，必须符合有关法律法规和政策，任何单位和个人不得强迫或者阻碍农户进行土地流转，不得以调整产业结构、扩大生产规模等名义收回承包权，不得以少数服从多数的办法搞土地流转。

坚持因地制宜、分类指导。推进土地承包经营权的流转，必须与当地农村生产力发展水平和农业生产区域特色相适应。要根据各地的生产力发展水平、非农产业发展程度和农村劳动力转移状况，分类指导，逐步推进。

坚持有序流转、规模经营。以农业产业发展规划为基础，以培育特色优势产业为目标，通过强化村级组织管理职能，加强引导和协调，促进土地集中流转，推进农业适度规模经营。

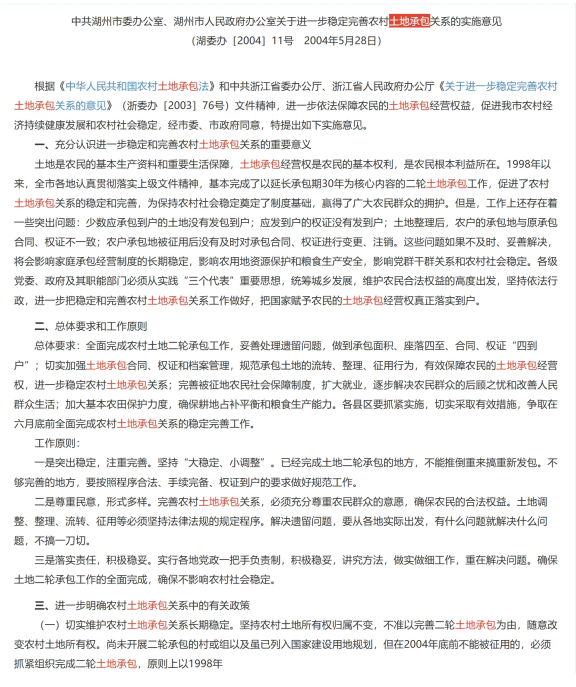
三、加强引导，加快推进土地承包经营权的流转

（一）积极鼓励农户依法采取转包、出租、互换、转让、入股等多种方式流转土地承包经营权，鼓励承包农户委托发包方和土地流转中介服务组织流转其承包土地。

（二）积极鼓励有资金、懂技术、善经营、会管理的种养大户、工商企业、农业龙头企业、农民专业合作社、农业科技人员等农业经营主体投资效益农业，连片开发农户流转的土地。

（三）在试点基础上逐步推广农村土地股份合作制，鼓励农户以土地承包经营权入股的形式组建土地股份合作社，引

(d) *Huzhou* Prefecture document



中共湖州市委办公室、湖州市人民政府办公室关于进一步稳定完善农村土地承包关系的实施意见

（湖委办〔2004〕11号　2004年5月28日）

根据《中华人民共和国农村土地承包法》和中共浙江省委办公厅、浙江省人民政府办公厅《关于进一步稳定完善农村土地承包关系的意见》（浙委办〔2003〕76号）文件精神，进一步依法保障农民的土地承包经营权益，促进我市农村经济持续健康发展和农村社会稳定，经市委、市政府同意，特提出如下实施意见。

一、充分认识进一步稳定和完善农村土地承包关系的重要意义

土地是农民的基本生产资料和重要生活保障，土地承包经营权是农民的基本权利，是农民根本利益所在。1998年以来，全市各地认真贯彻落实上级文件精神，基本完成了以延长承包期30年为核心内容的二轮土地承包工作，促进了农村土地承包关系的稳定和完善，为保持农村社会稳定奠定了制度基础，赢得了广大农民群众的拥护。但是，工作上还存在着一些突出问题：少数应承包到户的土地没有发包到户；应发到户的权证没有发到户；土地整理后，农户的承包地与原承包合同、权证不一致；农户承包地被征用后没有及时对承包合同、权证进行变更、注销。这些问题如果不及时、妥善解决，将会影响家庭承包经营制度的长期稳定，影响农用地资源保护和粮食生产安全，影响党群干群关系和农村社会稳定。各级党委、政府及其职能部门必须从实践“三个代表”重要思想，统筹城乡发展，维护农民合法权益的高度出发，坚持依法行政，进一步把稳定和完善农村土地承包关系工作做好，把国家赋予农民的土地承包经营权真正落实到户。

二、总体要求和工作原则

总体要求：全面完成农村土地二轮承包工作，妥善处理遗留问题，做到承包面积、座落四至、合同、权证“四到户”；切实加强土地承包合同、权证和档案管理，规范承包土地的流转、整理、征用行为，有效保障农民的土地承包经营权，进一步稳定农村土地承包关系；完善被征地农民社会保障制度，扩大就业，逐步解决农民群众的后顾之忧和改善人民群众生活；加大基本农田保护力度，确保耕地占补平衡和粮食生产能力。各县区要抓紧实施，切实采取有效措施，争取在六月底前全面完成农村土地承包关系的稳定完善工作。

工作原则：

一是突出稳定，注重完善。坚持“大稳定、小调整”。已经完成土地二轮承包的地方，不能推倒重来搞重新发包。不够完善的地方，要按照程序合法、手续完备、权证到户的要求做好规范工作。

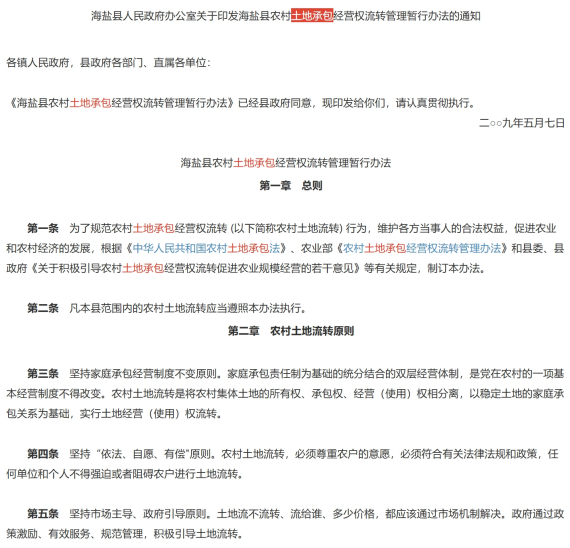
二是尊重民意，形式多样。完善农村土地承包关系，必须充分尊重农民群众的意愿，确保农民的合法权益。土地调整、整理、流转、征用等必须坚持法律法规的规定程序。解决遗留问题，要从各地实际出发，有什么问题就解决什么问题，不搞一刀切。

三是落实责任，积极稳妥。实行各地党政一把手负责制，积极稳妥，讲究方法，做实做细工作，重在解决问题。确保土地二轮承包工作的全面完成，确保不影响农村社会稳定。

三、进一步明确农村土地承包关系中的有关政策

（一）切实维护农村土地承包关系长期稳定。坚持农村土地所有权归属不变，不准以完善二轮土地承包为由，随意改变农村土地所有权。尚未开展二轮承包的村或组以及虽已列入国家建设用地规划，但在2004年底前不能被征用的，必须抓紧组织完成二轮土地承包，原则上以1998年

(e) *Haiyan* County



海盐县人民政府办公室关于印发海盐县农村土地承包经营权流转管理暂行办法的通知

各镇人民政府，县政府各部门、直属各单位：

《海盐县农村土地承包经营权流转管理暂行办法》已经县政府同意，现印发给你们，请认真贯彻执行。

二○○九年五月七日

海盐县农村土地承包经营权流转管理暂行办法

第一章　总则

第一条　为了规范农村土地承包经营权流转（以下简称农村土地流转）行为，维护各方当事人的合法权益，促进农业和农村经济的发展，根据《中华人民共和国农村土地承包法》、农业部《农村土地承包经营权流转管理办法》和县委、县政府《关于积极引导农村土地承包经营权流转促进农业规模经营的若干意见》等有关规定，制订本办法。

第二条　凡本县范围内的农村土地流转应当遵照本办法执行。

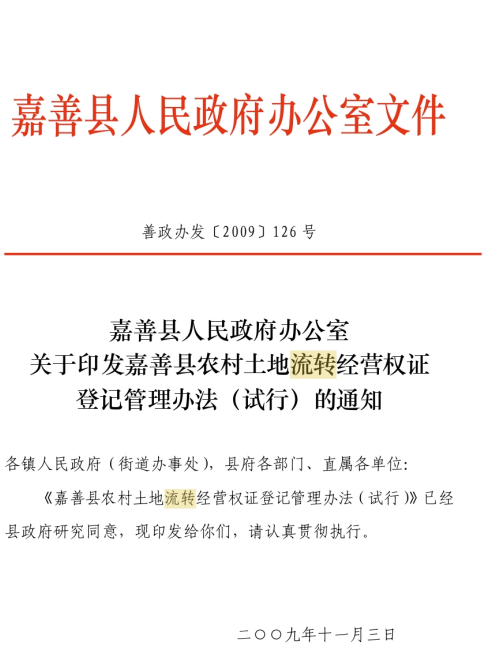
第二章　农村土地流转原则

第三条　坚持家庭承包经营制度不变原则。家庭承包责任制为基础的统分结合的双层经营体制，是党在农村的一项基本经营制度不得改变。农村土地流转是将农村集体土地的所有权、承包权、经营（使用）权相分离，以稳定土地的家庭承包关系为基础，实行土地经营（使用）权流转。

第四条　坚持“依法、自愿、有偿”原则。农村土地流转，必须尊重农户的意愿，必须符合有关法律法规和政策，任何单位和个人不得强迫或者阻碍农户进行土地流转。

第五条　坚持市场主导、政府引导原则。土地流不流转、流给谁、多少价格，都应该通过市场机制解决。政府通过政策激励、有效服务、规范管理，积极引导土地流转。

(f) *Jiashan County*



嘉善县人民政府办公室文件

善政办发〔2009〕126号

嘉善县人民政府办公室
关于印发嘉善县农村土地流转经营权证
登记管理办法（试行）的通知

各镇人民政府（街道办事处），县府各部门、直属各单位：

《嘉善县农村土地流转经营权证登记管理办法（试行）》已经县政府研究同意，现印发给你们，请认真贯彻执行。

二〇〇九年十一月三日

Notes: Source: `pkulaw.com`. Panels (a)–(f) show examples of policy documents on land contracting reform (the keywords used in the search) from the central level to the province, prefecture, and county levels.

Table B1: Summary Statistics: Census Agricultural *hukou* Sample

Variables	Obs.	Mean	SD	Min	Max
Non-ag Employment	13,140,026	0.22	0.42	0	1
Gender (1=female)	13,140,026	0.49	0.50	0	1
Minority	13,140,026	0.09	0.29	0	1
Age	13,140,026	34.4	10.5	18	55
Marital Status	13,140,026	0.78	0.41	0	1
Education (high skill)	13,140,026	0.004	0.07	0	1

Notes: This table displays summary statistics for the variables used in Table A1. Source: Individual-level data of Census and One Percent Population Survey from 1990, 2000, 2005, 2010, 2015, and 2020.

Table B2: CHIP (Urban): Summary Statistics

Variable	N	Mean	SD	Min	Max
Weighted Land Reform Index	104175	2.25	0.63	0.05	2.55
Hukou Reform Index	104175	4.01	1.71	1	6
Employment (=1)	104175	0.73	0.40	0	1
Income (Logged)	74175	6.83	3.86	0.65	15.84
Age	104175	36.9	9.70	18	55
Female	104175	0.50	0.50	0	1
Married (=1)	104175	0.81	0.39	0	1
Primary School and Below	19835	19.04%			
Middle School	23453	22.51&			
High School	36082	34.64%			
College or Above	24805	23.81%			

Notes: China Household Income Project (CHIP), aged 18–55, urban, non-agricultural *hukou* individuals.

Table B3: 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

Notes: Rural Fixed Point Survey (RFPS), aged 18–55, agricultural *hukou* individuals.

Table B4: 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

Notes: China Family Panel Studies (CFPS), aged 18–55, agricultural *hukou* individuals.

Table B5: Keywords: Search Documents from pkulaw.com

Keywords	Total	Province	City	County
	Land Contracting Reform			
Land Contracting ("土地承包")	1390	182	646	562
Land Transfer ("土地流转" or "土地转让")	574	142	289	143
Land Contracted Management ("土地经营")	1487	126	739	622
Total Number of Documents	3451	450	1674	1327
Unique Administrative Unit Issuing Policy		(27)	(256)	(348)
	Land Titling Reform			
Land Titling ("土地确权")	303	27	199	77
Land Certification ("土地登记")	768	31	375	362
Total Number of Documents	1071	58	574	439
Unique Administrative Unit Issuing Policy		(31)	(286)	(431)

Notes: This table presents the keywords used in the search for land contracting law and land titling reform, along with the corresponding document counts at various administrative levels sourced from `pkulaw.com`.

Table B6: Impact of Reforms on Rural Individuals' Migration and Employment, by Gender and Age

	Rural Individual Sample RFPS (2003–2017)			
	Aged between 18 and 44		Aged between 44 and 55	
Dependent Variables	Non-farm (=1)	Migration (=1)	Non-farm (=1)	Migration (=1)
	(1)	(2)	(3)	(4)
Land Reform	0.004	0.006	0.020***	0.015***
	(0.005)	(0.004)	(0.006)	(0.004)
Land Reform * Female	0.014***	0.008***	-0.008	-0.004
	(0.004)	(0.003)	(0.005)	(0.004)
Control Variables	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	228861	228861	120024	120024

Notes: Rural Fixed Point Survey 2003–2017. The dependent variable in columns 1 and 3 is a dummy variable that equals one if the surveyed individual devoted any labor days to non-farm employment during a year, while that in columns 2 and 4 is a dummy variable that equals one if the surveyed individual devoted any labor days to out-migration work during a year. Control variables include age, a dummy variable indicating whether one is cohabiting with a partner, and education level. All specifications control for individual fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table B7: Impact of Reforms on Rural Individuals' Migration by Education Level, Alternative Data

	Rural Individual Sample					
	All	High School and Below	College and Above	All	High School and Below	College and Above
Dependent Variables	Non-farm (=1)			Migration (=1)		
Panel A	CFPS (2010–2020)					
	(1)	(2)	(3)	(4)	(5)	(6)
Land Reform Index	0.016**	0.016**	0.029	0.013**	0.013**	0.024
	(0.007)	(0.007)	(0.020)	(0.007)	(0.007)	(0.042)
Land Reform Index * Female	0.009**	0.009**	0.012	0.008***	0.008***	0.013
	(0.004)	(0.004)	(0.023)	(0.003)	(0.003)	(0.025)
	114647	105962	7250	114647	105962	7250
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B	CHIP (1995–2018)					
	(7)	(8)	(9)	(10)	(11)	(12)
Land Reform Index	0.022	0.024	-0.139*	0.009	0.008*	-0.008
	(0.027)	(0.028)	(0.080)	(0.010)	(0.005)	(0.012)
Land Reform Index * Female	0.017***	0.019***	-0.01	0.014*	0.015***	0.007
	(0.004)	(0.004)	(0.013)	(0.009)	(0.004)	(0.010)
Observations	83546	78282	5237	83546	78282	5237
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel A use CFPS Rural Sample (2010–2020), while Panel B use CHIP Rural Sample (1995–2018). The dependent variables are a dummy variable that equals one if the surveyed individual devoted any labor days to non-farm employment during a year and a dummy variable that equals one if the surveyed individual devoted any labor days to out-migration work during a year. Columns 1, 4, 7 and 10 use the full sample, while columns 2–3, 5–6, 8–9, and 11–12 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. All specifications control for county fixed effects and year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table B8: Determinants of Employment and Migration, by Gender

	Non-farm (=1)		Migration (=1)	
	Female	Male	Female	Male
	(1)	(2)	(3)	(4)
Age	-0.008***	-0.004***	-0.013***	-0.011***
	(0.001)	(0.000)	(0.001)	(0.001)
With Child under 7 (=1)	-0.081***	0.014**	-0.068***	0.013
	(0.008)	(0.007)	(0.007)	(0.008)
With Elderly above 65 (=1)	0.029***	0.002	0.010	0.001
	(0.009)	(0.007)	(0.008)	(0.010)
Married (=1)	-0.045***	-0.021***	-0.046***	-0.051***
	(0.010)	(0.008)	(0.009)	(0.010)
Education Level	0.038***	0.016***	0.038***	0.017**
	(0.008)	(0.006)	(0.007)	(0.008)
Health	0.016	0.020**	-0.001	-0.001
	(0.012)	(0.010)	(0.010)	(0.011)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	256875	275275	256875	275275

Notes: Rural Fixed Point Survey 2003–2017, aged 18–55. The dependent variable in columns 1 to 2: a dummy equal to one if the surveyed individual devoted any labor days to non-farm employment during a year, while that in columns 3 to 4: a dummy equal to one if the surveyed individual devoted any labor days to out-migration work during a year. Individual control variables include age, household presence of child under 7, household presence of an elderly person above 65, marital status, education level, and self-reported health (exclude those reporting unhealthy). All specifications control for year fixed effects. Standard errors clustered at the county level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.