Gift of relocation: Women's decision making power consequences of China's poverty alleviation relocation program

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Abstract Women empowerment is one of the key goals of 17 Sustainable Development Goals (SDGs) and women's relative decision making power within households is an essential part of it. However, distinguishing exogenous variations of women's decision making power within households and selection is challenging. Using 2019 and 2021 survey data of the large-scale poverty alleviation relocation program (PARP) in China, this paper exploits quasi-experimental variations in the relocation time to explore the impact of relocation on women's relative decision making power within households. To address potential endogenous selection problem, we exploit the instrument strategy to identify the causal effect of relocation. Our findings show that there is a significant increase of wife's relative decision making power within households. The mechanism analysis indicates that relocated households have better access to county, which can relax their time budget constraint. More interestingly, we find that the increase of absolute wage income of wives acts as the 'real' distribution factor and hence as a determinant of her relative decision making power, rather than the reduction of wage gap between husband and wife.

Keywords: women empowerment, intra-household decision making power, poverty alleviation relocation, non-farm wage income, time allocation

1. Introduction

Women empowerment is one of the core issues of social and economic development, particularly in the developing world. The Sustainable Development Goals (SDGs) have highlighted the importance of gender equality and empowerment of women and girls (SDG 5), which is also recognized as the prerequisite for the achievement of other Sustainable Development Goals such as no poverty, good health and wellbeing, and quality education (Duflo, 2012). From the COVID-19 pandemic, progress made in narrowing gender inequalities is falling behind (UN, 2022). Evidence suggests that women and girls are disproportionately affected by the COVID-19 crisis, struggling with lost jobs and livelihoods, derailed education, increased burdens of unpaid care work and domestic violence (Couch et al., 2022; Deryugina et al., 2021; Myers et al., 2020).

An increasingly number of researches have focused on evaluating the effects of micro-finance programs on women's decision making power, attempting to find sustainable ways to promote women empowerment within households and reduce poverty (Banerjee et al., 2015; Kochar et al., 2022). However, the evidence of these programs are mixed. For example, Jayachandran et al. (2020) suggests that only half the studies they reviewed find significantly positive effects on women's decision making power. One explanation for these insignificant effects comes from the poverty trap theory, arguing that movements out of poverty require a "big push" and thus partial interventions towards poor women cannot enable systemic changes in women's status (Balboni et al., 2022; Ghatak, 2015).[1] A question arising from this is that can big push programs improve women's decision making power within households?

Using arguably the largest natural experiment in poverty alleviation in China's history, this paper explores the causal effect of the poverty alleviation relocation program on women's decision making power within households. During the 13th five-year plan period (2015-2020), the poverty alleviation relocation program (PARP) relocated more than 9.6 million below-poverty-line people from inhospitable areas to better locations across around 1,400 counties of 22 provinces (The State Council Information Office of the PRC, 2021). In this program, local government at the county level had the discretion to independently determine the relocation time of targeted population, creating exogenous phasing variations of relocation.

To evaluate PARP, our team implemented a longitudinal survey of 2,185 target households across 8 of China's provinces that had the largest size of relocated population from 2016 to 2021. In 2019 and 2021, our team augmented the survey with additional modules about household decision making, enabling us to investigate the impact of the poverty alleviation relocation on women's intra-household decision making power using two panel waves. The considerable change in the livelihood environment of sampled households due to PARP is rarely available compared with other poverty alleviation programs in the world, facilitating us to examine the poverty trap theory.

[1] For example, many programs provide women with micro-finance, but not provide them with training to upgrade their skills.

Applying a household fixed model, this paper finds that moving away from inhospitable areas due to PARP is associated with a large increase in married women's relative decision making power within households. To address potential selection effects, we employ an instrumental variable (IV) strategy which instruments sampled households' actual treatment status by the relocation plan of the villager group where the household lived in. Specifically, this IV strategy identifies the local average treatment effect for the compliers of the PARP – relocated households who were expected to relocate at the time of the survey year according to the relocation plan of the villager group. Our 2SLS estimation shows that married women's relative decision making power increases by roughly 0.74 score (the average score of married women's relative decision making power of non-relocated households is -3.357). Further analysis reveals that the increase of absolute wage income of married women acts as the 'real' distribution factor and hence as a determinant of their relative decision making power, rather than the reduction of wage gap between couples. Increased access to microcredit and neatest counties for relocated households are also important channels through which PARP can affect married women's relative decision making power.

The benefits of relocation on married women's decision making roles are, however, heterogeneous among different types of households. We find that relocation significantly increases women's decision making role for urban-relocated households, while insignificant for rural-relocated households. Although relocation has a significant positive effect on both off-farm and non-off-farm women, the positive effect of relocation on women's relative decision making power for off-farm women is larger than non-off-farm women. This implies that married women's decision making power is determined by their outside choices of the marriage, no matter whether they actually involved in the off-farm work. Furthermore, we do not find significant evidence that wife's outmigration is associated with improved outcomes for their decision making power within households.

With these analyses, our study contributes to the literature mainly in two ways. First, our study is closely related to literature on intra-household decision making power. Given the mixed findings of the effects of various programs on women's role in household decisions, this paper fills this gap by exploiting variations in the relocation time of PARP to identify the causal relationship between relocation and women's relative decision making power within

households. To the best of our knowledge, this is the first paper to employ exogenous shocks of poverty alleviation relocation to study changes of women's relative decision making power. Second, understanding how relocation affect household outcomes in developing countries remains an important question. Although a small number of studies have made use of experimental and quasi-experimental variation to identify the causal effects of relocation or moving, these studies are mostly restricted to developed countries and these experiments are on a much smaller scale than China's poverty alleviation relocation program (Bryan et al., 2014; Chetty et al., 2016; Chetty and Hendren, 2018; Chyn, 2018; Nakamura and Sigurdsson, 2019).[2] In addition, few studies have focused on the causal effect of relocation on women's intra-household decision making power. A large body of literature on family economics has revealed that the increase of women's relative decision making power within households will not only improve their health and nutritional status, but also have important positive impacts on a series of family outcomes, such as resource allocations and intergenerational effects. Therefore, exploring the direction and magnitude of the effects of relocation on women's relative decision making power will help inform anti-poverty policies.

The rest of this study proceeds as follows. Section 2 provides a short description of China's poverty alleviation relocation program and its implementation. Section 3 describes our survey and data. Section 4 outlines our empirical strategy and section 5 presents our results of the effects of relocation on women's relative decision making power within households. Section 6 discusses potential channels and our interpretation of the causal relationship between relocation and women's intra-household decision making power. Section 7 analyzes the heterogeneous effects and the final section concludes.

2. China's poverty alleviation relocation program and its implementation

China has seen a large reduction in poverty and 750 million people have been lifted out of poverty since its reform and opening-up in 1980s. In November 2020, China accomplished its poverty alleviation target with all 832 national poor counties removed from poverty,

[2] For example, there is a bundle of literature studying the long-term intergenerational effects of "moving to opportunity" policies that aims to reduce poverty by giving families vouchers to move from high-poverty areas to lower-poverty areas (Chetty et al., 2016; Chetty and Hendren, 2018).

eradicating absolute poverty and overall regional poverty. As an effective way to reduce poverty, China's poverty alleviation relocation experienced three stages over four decades: the first stage during 1983 to 1999, the second stage during 2000 to 2015, and the third stage during 2016 to 2020.

2.1 First stage poverty alleviation relocation program (1983-1999)

The history of poverty alleviation through relocation in China can be traced back to the 1980s. In 1983, because of severe water shortage, the "three West" areas (Dingxi and Hexi in Gansu Province and Xihaigu in Ningxia Hui Autonomous Region) explored the approach of *Diaozhuang*, which was a pioneer in poverty alleviation through relocation.[3] This was the earliest organized regional poverty alleviation relocation program in China, which generated typical experience for future poverty alleviation relocation.

With the incidence of poverty experiencing a dramatic decline, China's poverty alleviation target has gradually changed from pure relief to economic development in the 1990s. Based on the past practice, Chinese central government promulgated the *8-7 Plan* in 1993, which officially listed relocation as a basic approach to poverty alleviation. Six provinces formulated and introduced relevant poverty alleviation relocation policies, vowing to relocate around 2.245 million poor people of extreme poverty within seven years.

2.2 *Second stage poverty alleviation relocation program (2000-2015)*

China's poverty alleviation has received the stage victory after the first stage. Official statistics indicate that the number of absolute poverty population decreased from 85 million in 1990 to 32 million in 2000 (Park and Wang, 2001). In order to consolidate the poverty reduction achievements and solve the remaining poverty, in 2001 the central government formulated and implemented the *Outline of China's Rural Poverty Alleviation and Development (2001-2010)*, stating again that voluntary relocation of impoverished people living in inhospitable areas should be considered as a fundamental approach to alleviate poverty. This marks a new stage of China's poverty alleviation relocation from local exploration to national design.

[3] *Diaozhuang* is an approach that relocates villagers collectively (at the village level) from poverty-stricken areas to places with better environment conditions. In the 1980s, there were no areas implementing poverty alleviation relocation programs in China except the "three West" areas.

In 2012, the Central Development and Reform Commission of PRC issued the *12th Five-Year Plan for Poverty Alleviation and Relocation (2011-2015)*, making overall arrangements for poverty alleviation funds used for relocation. During 2011 to 2015, 23.1 billion yuan was invested by the central government, and nearly 80 billion yuan was collected from other central government departments, local governments and the public. As a result, 3.94 million people were relocated during the five years.

2.3 *Third stage poverty alleviation relocation program (2016-2020)*

Judged by the World Bank's $1.90 a day poverty line, China's national poverty rate fell from almost 90% in 1981 to under 4% in 2016 (Ravallion, 2021). However, there is still remaining poverty concentrated in several mountainous areas with harsh natural conditions and frequent natural disasters (Li et al., 2018). It would be extremely hard for them to shake off poverty if they remained where they were, which is described as "natural resources are not capable of maintaining the livelihoods of local people" (The State Council Information Office of the PRC, 2021). To address the poverty trap problem for these difficult "hard nut", Chinese central government decided to spend another five years lifting about 10 million people out of poverty. During 2016-2020, the poverty alleviation relocation program (PARP) is regarded as an essential part of comprehensive poverty elimination and a milestone in winning the final fight against extreme poverty.

The Chinese government plays a crucial role in implementing PARP. China has established a complete contingent of poverty alleviation officials at the five administrative levels (province, city, county, township and village level) and formed resident working teams that assigned officials to poor villages. To promote relocation, poverty alleviation cadres have mobilized targeted households extensively and intensively and explained the reasons of relocation to them. The conditions and needs of targeted households were given full consideration, the scale of relocation was determined through research, and feasible plans were worked out and implemented in steps. From 2016 to 2020, more than 9.6 million people from inhospitable areas have shaken off poverty through relocation, with the scale exceeding 6.8 million relocated people from 1983 to 2015 (The State Council Information Office of the PRC, 2021). This relocation scale was arguably much larger than the "moving to opportunity" experiment in the US that aimed to reduce poverty by moving households from

disadvantaged neighborhoods to better ones (Chetty et al., 2016).[4]

To improve the restoration of ecological environment, houses of relocated households in origin villages were turned into farmland or planted with trees. At the same time, more than 1 trillion yuan were invested to develop infrastructure and public services in the resettlement sites, and follow-up assistance measures such as employment and financial support have also been provided to relocated population. Official data has revealed that 73.7 percent of relocated people with working abilities have found jobs and 94.1 percent of relocated households with members who were able to work were in employment at the end of 2020 (The State Council Information Office of the PRC, 2021).

The PARP also pays special attention to the female group because they are more likely to stay behind compared with men. For example, some poverty alleviation workshops were built to grant poor women livelihood-generating jobs and provide them with training to upgrade their vocational skills and improve their financial literacy. These measures also aligns with the spirit of *the Outline of Chinese Women's Development (2011-2020)*, which emphasizes the importance of poverty alleviation measures targeted at women such as greater support for poor women in health protection, microfinance and vocational education.

3. Data

3.1. Survey

Our survey data comes from a longitudinal survey of rural poor households planning to relocate across eight of China's provinces from 2016 to 2021. The survey was designed to evaluate the impact of PARP on the welfare of relocated households exploiting its variations in phasing across counties. The survey, launched in 2016 by School of Agricultural Economics and Rural Development at Renmin University of China, used three-stage stratified random sampling technique to select sample households: At the first stage, our team selected eight provinces that had the largest size of relocated population and then selected two counties implementing the PARP in each province.[5] The selected 16 counties cover 15

[4] The moving to opportunity experiment was conducted by the US Department of Housing and Urban Development, which enrolled 4,604 low-income families living in five US cities (Baltimore, Boston, Chicago, Los Angeles, and New York) from 1994 to 1998 (Chetty et al., 2016).

[5] These provinces are: Hubei, Hunan, Guangxi, Sichuan, Guizhou, Yunan, Shaanxi and Gansu. According to the poverty alleviation relocation plan for the 13th Five-Year Plan period (2016-2020), the eight provinces plan to relocate more than 500,000 people during the 13th Five-Year Plan period, making them

districts in five contiguous areas of extreme poverty[6] and one national poor county outside the area. At the second stage, we selected two or three townships in each county considering the relocation scale and time. Then we randomly selected three villages in each township and two villager groups in each village. Finally, we interviewed ten households from each sampled group of villagers. Follow-up waves were conducted in 2017, 2019, and 2021. In the 2016 baseline survey, the survey successfully interviewed nearly 2,185 households planning to relocate and 8,330 individuals within these households, comprising 2,019 registered poor households and 166 nonregistered poor households.

Our survey collected detailed information on household, origin village and resettlement community characteristics. The household questionnaire includes modules on household demographic features, household income and expenditure, livelihood assets (land, productive assets, consumption assets, etc.), housing situation and other household characteristics. A distinguishing feature of our survey, however, is its collection of detailed information on relocation types (urban or rural relocation), relocation time (planned and actual time), construction of resettlement community and a wide range of follow-up measures (employment support, financial support, community management, etc.). This information enables us to identity whether the household has relocated according to the question about whether someone has moved into the new house and the exact relocation year for relocated households. Figure 1 documents the distribution of relocation year of sampled households, varying from 2015 to 2021. The largest proportion of households relocated in 2017 (32.56%) and 2018 (28.56%), but there were few households relocated before 2016 and after 2020.

In 2019 and 2021, our team augmented the survey with additional modules about household decision making. Specifically, the survey asked the household respondent about who made the decision over: 1) the purchase of daily goods; 2) the purchase of household durables and house; 3) chores; 4) education of children; 5) household big affairs (weddings, funerals, etc.); 6) grocery shopping and cook. Therefore, we can investigate the impact of relocation on women's relative decision making power within households using these six

the eight provinces with the largest relocation scale (National Development and Reform Commission of PRC, 2016).

[6] The five contiguous areas of extreme poverty are: Wuling Mountain area, Yunnan, Guangxi and Guizhou rocky desertification area, Qinba Mountain area, Wumeng Mountain area and Liupan Mountain area.

questions. The considerable change in the environment of sampled households due to PARP generates corresponding change in household outcomes, variation that is rarely available in studies targeted at below-poverty-line households. The origin village questionnaire and resettlement community questionnaire collected information on socioeconomic characteristics.

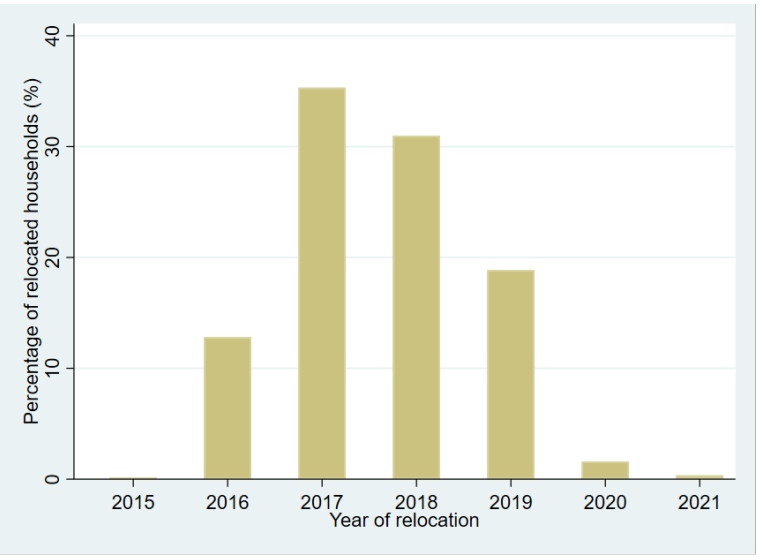

Figure 1 Distribution of relocation year of sampled households

Data source: author's survey data.

3.2 Sample

We applied several restrictions to form our analytical sample. First, we restricted data to the 2019 and 2021 wave because the decision making power module was only conducted in these two years. Second, we exclude households polluted by other policies, including renovation of dilapidated houses, construction of beautiful countryside, reconstruction of origin locations and expel over ineligible households. Next, because the focus of this paper is women's decision making power within households, we restrict our attention to households that had at least one couple. After dropping observations with missing values, we obtain an analytical sample with 1,898 households from the 2019 and 2021 wave, enabling our study to control for fixed household characteristics.

3.3 Variables and summary statistics

Table 1 presents definitions and descriptive statistics of the main variables used in our regression analysis. Specifically, our outcome variable is women's aggregate relative decision

making power index (RDMP). We follow the literature in measuring women's relative decision making power within households, proxied by the number of household decisions made by woman minus the number of decisions made by her husband (Banerjee et al., 2015; Kochar et al., 2022; Majlesi, 2016). Considering a decision could be made by one of the spouses, jointly, or someone else, we assume this decision is made by both partners if it is made jointly by the couple. To ensure the robustness of our results, we also conduct robustness checks using alternative measures of women's relative decision making power index.

Table 1 also shows characteristics of couples (age, educational attainment, ethnicity, health status, politic status, cadre status and religion of the husband and wife), of interviewees (age and gender of the interviewee[7]), and of households (family size, number of children, number of children aged below 6 years, number of children aged between 7 and 15 years[8], whether the household is identified as poor). For the purpose of our study, we define households that have relocated as the treatment group and those that haven't relocated as the control group. Column 1 of Table 1 summarizes the data for the full sample, and column 2 and column 3 of Table 1 present the data for treatment group and control group, respectively.

As Table 1 shows, the mean value of women's relative decision making power index is -2.782 (out of a maximum score of 2), meaning that wives make around 3 fewer decisions than their husbands on average. Women's relative decision making power is significantly higher for relocated households than those not. Table 1 also presents the mean values for women's relative decision making power over six categories, which is consistent with the pattern of women's aggregate decision making power, with the exception of women's relative decision making power over the purchase of daily goods showing that there is no significant

[7] A growing literature has shown that men and women interpret questions differently, resulting in disagreement about wives' involvement in decision making (Ambler et al., 2021; Majlesi, 2016). For example, a woman indicates that she is involved in a certain decision making process but her husband does not because she hides some resources and actions from her husband (Aker et al., 2016). Therefore, we control the age and gender of the interviewee to mitigate the measurement error of the decision making index.

[8] Studies have revealed that the presence of children below 6 years within a household is expected to affect women employment due to increased care responsibilities and motherhood penalty, while the presence of children between 7 to 15 years may help relieve women of some domestic work (Couch et al., 2022; Danquah et al., 2021). Therefore, we include the age structure of children within a household to capture the effect of motherhood penalty.

difference between the treatment and control group.

Table 1 also reveals some prominent characteristics of poor households. First, the average age of husband and wife is older (aged above 50 years on average) compared with related literature. Current studies have generally focused on women's decision making power in the 20-50 age group, neglecting the fact that women's bargaining power and welfare may decline with age (Anderson and Ray, 2010; Calvi, 2021). Second, the average educational attainment is 5.356 years and 3.515 years for the husband and wife, respectively, even shorter than 6 years required to complete primary school in China. Husband's and wife's years of education are both significantly higher for relocated households than those not. Third, the share of CCP membership and cadre are both extremely low for the husband and wife. And the average family size is about 4.755, with the average number of children being 0.856. 99.2% sampled households are identified as poor. Finally, the health status of husband, the proportion of wife being a member of CCP and proportion of male respondents in the treatment group is significantly lower than that in the control group. Overall, there are a dozen of covariates. It is acceptable that only four coefficients have significant difference between the treatment and control group. However, to ensure our empirical results are not driven by observable characteristics, we also control these covariates in all regressions.

Table 1 Summary statistics

Variables	Definition	Full sample	Treatment group	Control group	Difference
		(1)	(2)	(3)	(4)=(2)-(3)
Dependent Variables					
Women's aggregate relative decision making power (RDMP)	number of decisions made by wife - number of decisions made by husband	-2.782 (2.260)	-2.660 (2.269)	-3.357 (2.132)	0.696*** (0.136)
Women's relative decision making power on purchasing daily goods	1=made by wife, 0=made by husband or made jointly	-0.002 (0.887)	0.012 (0.887)	-0.070 (0.883)	0.082 (0.053)
Women's relative decision making power on purchasing durable goods and house	1=made by wife, 0=made by husband or made jointly	-0.685 (0.618)	-0.660 (0.639)	-0.803 (0.487)	0.144*** (0.037)
Women's relative decision making power on chores	1=made by wife, 0=made by husband or made jointly	-0.552 (0.713)	-0.531 (0.725)	-0.649 (0.645)	0.118*** (0.043)
Women's relative decision making power on children's education	1=made by wife, 0=made by husband or made jointly	-0.189 (0.822)	-0.166 (0.824)	-0.302 (0.801)	0.137*** (0.050)
Women's relative decision making power on big affairs	1=made by wife, 0=made by husband or made jointly	-0.708 (0.588)	-0.690 (0.603)	-0.791 (0.506)	0.102*** (0.036)
Women's relative decision making power on grocery shopping and cook	1=made by wife, 1=made by husband or made jointly	-0.646 (0.643)	-0.626 (0.656)	-0.740 (0.566)	0.114*** (0.039)
Individual and Household Characteristics					
Age of husband	years	56.100 (11.295)	55.985 (11.202)	56.647 (11.727)	-0.662 (0.684)
Age of wife	years	52.942 (11.537)	52.870 (11.461)	53.281 (11.902)	-0.411 (0.698)
Education years of husband	years	5.356 (3.232)	5.464 (3.191)	4.843 (3.376)	0.621*** (0.195)
Education years of wife	years	3.515 (3.284)	3.654 (3.270)	2.858 (3.272)	0.796*** (0.198)
Ethnicity of husband	1=*Han*, 0 otherwise	0.772 (1.561)	0.781 (1.706)	0.728 (0.446)	0.053 (0.095)
Ethnicity of wife	1=*Han*, 0 otherwise	0.729 (0.445)	0.730 (0.444)	0.722 (0.449)	0.008 (0.027)
Health status of husband	1=healthy, 2=having diseases (mental, heart, chronic, et al), 3=disabled	1.467 (0.621)	1.456 (0.611)	1.520 (0.662)	-0.064* (0.037)
Health status of wife	1=healthy, 2=having diseases (mental, heart, chronic, et al), 3=disabled	1.472 (0.599)	1.480 (0.604)	1.435 (0.576)	0.045 (0.036)
Politic status of husband	1=member of CCP, 0 otherwise	0.053 (0.224)	0.052 (0.221)	0.058 (0.233)	-0.005 (0.014)
Politic status of wife	1=member of CCP, 0 otherwise	0.015 (0.121)	0.012 (0.109)	0.027 (0.163)	-0.015** (0.007)
Cadre status of husband	1=cadre, 0 otherwise	0.037 (0.190)	0.036 (0.186)	0.045 (0.208)	-0.009 (0.012)
Cadre status of wife	1=cadre, 0 otherwise	0.007 (0.086)	0.007 (0.084)	0.009 (0.095)	-0.002 (0.005)
Religion of husband	1=believe in religon, 0 otherwise	0.029 (0.166)	0.030 (0.169)	0.024 (0.154)	0.005 (0.010)
Religion of wife	1=believe in religon, 0 otherwise	0.032 (0.175)	0.033 (0.178)	0.027 (0.163)	0.005 (0.011)
Gender of interviewee	1=male, 0=female	0.660 (0.474)	0.651 (0.477)	0.701 (0.459)	-0.050** (0.029)
Age of interviewee	years	54.065 (13.153)	53.995 (13.206)	54.396 (12.914)	-0.401 (0.796)
Family size	number	4.755 (1.652)	4.728 (1.634)	4.882 (1.732)	-0.154 (0.100)
Number of children	number	0.856 (1.043)	0.853 (1.038)	0.870 (1.067)	-0.017 (0.063)
Number of children aged ≤ 6 years	number	0.233 (0.579)	0.227 (0.562)	0.260 (0.651)	-0.033 (0.035)
Number of children aged 7-15 years	number	0.509 (0.788)	0.512 (0.791)	0.496 (0.776)	0.017 (0.048)
Whether the family is identified as poor	1=yes, 0 otherwise	0.992 (0.092)	0.993 (0.084)	0.985 (0.122)	0.008 (0.005)
N		1,898	1,567	331	

Note: Standard deviations (column 1, 2, 3) and standard errors (column 4) are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Data source: author's survey data.

4. Empirical strategy

To investigate the effect of relocation on (married) women's relative decision making power, we use the following basic regression specification:

$$RDMP_{ivt} = \beta_1 Relocate_{it} + \beta_2 X_{it}^{w} + \beta_3 X_{it}^{h} + \beta_4 X_{it}^{f} + \delta_i + \gamma_l + \varepsilon_{ivt} \quad (1)$$

where $RDMP_{ivt}$ represents woman's relative decision making power within household *i* in village *v* at the survey year *t*, which is defined as the number of household decisions made by wife minus the number of decisions made by her husband within household i. $Relocate_{it}$ is a dummy variable indicating whether the household *i* has relocated at the survey year *t*. X_{it}^{w} and X_{it}^{h} represent the wife's and husband's individual characteristics, including age, educational attainment, ethnicity, health status, politic status, cadre status and religion. X_{it}^{f} is a set of controls for household characteristics, including the family size, number of children, number of children aged below 6 years, number of children aged between 7 and 15 years and whether the household is identified as poor. δ_i represents the household fixed effect, which absorbs unobservable time-invariant heterogeneity that may affect household's decision making process. We also include a set of relocation year fixed effects γ_l to capture common shocks that affect all households similarly. ε_{ivt} is the error term, which is clustered at the village level. Given the fact that there are two rounds of survey data, the empirical specification is exactly the first-difference version of equation (1).

The main parameter of interest is β_1, which captures the average effect of relocation on (married) women's aggregate relative decision making power within households. If households were to relocate totally according to local government's relocation plan, estimating equation (1) by ordinary least-squares (OLS) would deliver the average causal effect of relocation. However, household's decision to relocate is obviously far from exogenous. The central empirical challenge faced by the literature on the effects of moving or relocation is how to deal with selection effects (Nakamuran et al., 2021). In the execution of PARP, the government respected

targeted households' relocation wishes and declared that they will only relocate households who were eligible and agreed to relocate. This means that targeted households have discretionary power to determine whether and when to relocate. For example, if households with higher status of women are more likely to relocate than those with lower status of women, then women of relocated households may have a higher decision making power than those of non-relocated households even if there is no causal effect of relocation.

To address this challenge, we employ an instrumental variable (IV) strategy that is plausibly exogenous with respect to the unobserved characteristics of sampled households and individuals. Specifically, we instrument $Relocate_{it}$ using an indicator variable for whether the household living in a certain villager group was expected to relocate according to the expected relocation year at the survey year *t*. The first-stage regression in our IV strategy is then given by:

$$Relocate_{it} = \alpha_1 Plan_{it} + \alpha_2 X_{it}^{w} + \alpha_3 X_{it}^{h} + \alpha_4 X_{it}^{f} + \delta_i + \gamma_l + \varepsilon_{ivt} \qquad (2)$$

where $Plan_{it}$ is a dummy variable indicating whether the household *i* should relocate at the survey year *t* according to the relocation plan of the villager group. The coefficient α_1 thus captures the intention-to-treatment (ITT) effect of the expected relocation status on the probability of real relocation for targeted households.

This IV strategy builds off of the identification strategy developed by Imbens and Angrist (1994), which identifies the causal effect on the "compliers" in our quasi-natural experiment. The households that relocate if and only if they are targeted to relocate are the "compliers". However, our survey only interviewed households that were targeted to relocate. Therefore, in our context, the complier group only consist of relocated households that were targeted to relocate (but would have stayed had they were spared from the relocation plan).[9] Our IV estimate identifies the local average treatment effect for this complier group.[10] The reduced form equation is as follows:

[9] The complier group should also consist of non-relocated households that were not targeted to relocate (but they would have relocated if they were targeted to relocate) by the language of Imbens and Angrist (1994).

[10] Our IV strategy also requires a monotonicity assumption to be valid. In our context, this assumption rules out the existence of households that would have relocated if they were not

$$RDMP_{ivt} = \tilde{\beta}_1 Plan_{it} + \tilde{\beta}_2 X_{it}^{w} + \tilde{\beta}_3 X_{it}^{h} + \tilde{\beta}_4 X_{it}^{f} + \tilde{\delta}_i + \tilde{\gamma}_l + \tilde{\varepsilon}_{ivt} \quad (3)$$

where $\tilde{\beta}_1$ represents the reduced form impact of the relocation instrument on (married) women's relative decision making power within households. For the following baseline results, I report the estimated OLS (β_1), reduced form ($\tilde{\beta}_1$), and 2SLS ($\tilde{\beta}_1/\alpha_1$) coefficients.

5. Results

5.1 Propensity to relocation

A first requirement for our IV strategy to be valid is that the relocation planning of villager groups indicating when targeted households are expected to relocate, indeed, have a strong and statistically significant effect on the propensity of households to relocate to other areas at the time of planning relocation year and survey year. Figure 2 compares the distribution of expected and real relocation year of sampled households, shows that the expected year of relocation varies from 2012 to 2019, while the real year of relocation varies from 2015 to 2021. Furthermore, there is a large overlap between the expected relocation year and real relocation year. This figure illustrates that although there is a lag in targeted households' relocation behavior, approximately half of our sampled households (50.92%) relocated in the expected relocation year.

targeted to relocate but were induced to stay by the fact that they were targeted to relocate (Angrist and Pischke, 2009). While it is possible that the monotonicity assumption can be violated in our setting, we think it is unlikely. The targeted households in PARP are located in poor, remote, and ecologically degraded areas, meaning that they are not capable of relocating by themselves. In addition, a reaction of defiance is likely to be strongest among those with the strongest attachment to the origin village (households that don't want to relocate regardless of the relocation plan), but these are "never-takers".

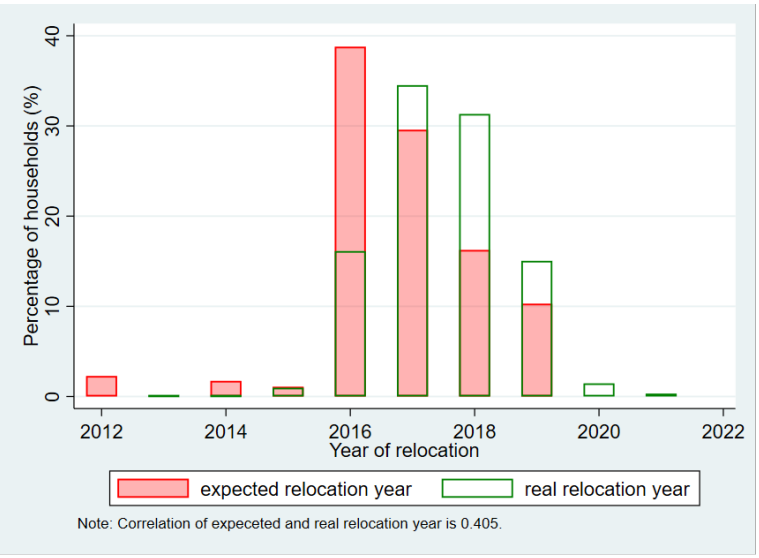

Figure 2 Comparisons of the distributions of expected and real relocation year

The first column of Table 2 reports estimates of the first-stage regression, where $Relocate$ is regressed on $Plan$ conditional on controls and a set of fixed effects. The first-stage coefficient α_1 is statistically significant at 1% level, indicating that the expected year of relocation can explain 64.3% actual relocation status of sampled households at the time of survey year. The F-statistic on the first-stage is 102.5395, confirming the validity of our IV strategy.

A second requirement of our IV validity checks is that the instrument for actual relocation status must be orthogonal to omitted variables that are correlated with changes in women's relative decision making power within households. Although this assumption cannot be directly tested, relying on exogenous variations of the villager group-level relocation planning assuages concerns that our instrument for household's actual relocation status is correlated with unobserved household and individual determinants of women's relative decision making power within households. However, the timing of the villager group-level relocation may still have been endogenous to villager group conditions. Therefore, we examine the determinants of the timing of expected relocation and the results are reported in Appendix A1. We find that a range of villager group level outcomes before PARP, such as demographic characteristics, land area, disaster frequency and elevation, do not predict the timing

of expected relocation, enhancing the credibility of our IV strategy.

5.2 Main results

Columns 2 and 3 of Table 2 report OLS estimates of equation (1), including a set of controls, county or household fixed effect and moving year fixed effect. When column 2 controls for county fixed effects, the estimated coefficient of $Relocate$ is both small in magnitude and statistically insignificant. The estimated coefficient of $Relocate$ in column 3 is much larger in magnitude than that in column 2, replacing county fixed effects with household fixed effects while keeping other specifications unchanged. Nevertheless, the differences in the magnitudes may indicate that omitted (time-invariant) characteristics such as attachment to origin locations are correlated with both relocation and women's intra-household relative decision making power.[11] Therefore, we employ household fixed effects rather than county fixed effects in the following analysis to avoid potential downward bias.

Columns 4 of Table 2 presents estimates of the reduced form effect of the instrument $Plan$ on women's relative decision making power index within households. The estimated coefficient of $Plan$ is significantly positive. Specifically, women's relative decision making power index of households that were expected to relocate at the time of survey year on average was roughly 0.48 higher than those not, conditional on controls, household fixed effect and moving year fixed effect. The significant coefficient of $Plan$ in column 4 relative to the OLS coefficient in column 3 suggests that relocated households may adversely selected relative to non-relocated households, households with relatively low women's bargaining power are more likely to be compliers in our context.

Columns 5 of Table 2 reports the two-stage least squares (2SLS) estimate of equation (1). The 2SLS estimated coefficient of $Relocate$ is significantly positive and much bigger than that of OLS and reduced form estimation. This estimation

[11] People's strong attachment to origin locations may lead to the defiance of relocation (Nakamuran et al., 2021). A relative increase in women's bargaining power within households can also weaken the family's ties to the origin community, indicating household's attachment level is correlated with women's decision making power (Luke and Munshi, 2011). Therefore, if we don't capture household's attachment to origin locations, the OLS estimation will be biased towards zero.

suggests the causal effect of relocation on women's decision making power is roughly 0.74. In other words, relocation can significantly improve women's decision making power of non-relocated households from -3.357 to -2.617. To ensure the robustness of our results to alternative ways of constructing the decision making index, Appendix Table A2 reports 2SLS estimate of several alternative indices. All estimated coefficients of $Relocate$ are significantly positive in Table A1 no matter what methods are used in calculating our decision making index, lending further support to our main result.

Table 2 The effect of relocation on women's relative decision making power index

	Plan	Women's relative decision making power index			
	(First-stage)	(OLS)	(OLS)	(Reduced form)	(2SLS)
	(1)	(2)	(3)	(4)	(5)
Relocate		0.023	0.239		0.742**
		(0.170)	(0.175)		(0.306)
Plan	0.643***			0.478**	
	(0.064)			(0.220)	
Controls	Yes	Yes	Yes	Yes	Yes
County fixed effect	No	Yes	No	No	No
Household fixed effect	Yes	No	Yes	Yes	Yes
Moving year fixed effect	Yes	Yes	Yes	Yes	Yes
F statistic	102.5395	-	-	-	-
R^2	0.7960	0.1233	0.7088	0.7095	0.0363
Adjusted R^2	0.5782	0.1014	0.3978	0.3992	0.0199
Within R^2	0.3032	0.0936	0.0425	0.0447	-
N	1848	1848	1848	1848	1848

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Standard errors clustered at the village level are reported in parentheses. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

5.3 Decomposition of the increase of women's relative decision making power

One might argue that a positive change in women's aggregate relative decision making power may not necessarily mean an increase in women's decision making status within households. The importance of different decisions varies and women might take control of more decisions that are less important (such as decisions over chores, grocery shopping and cook) at the expense of giving up power over more important ones (Majlesi, 2016). To address this and investigate which decisions are

most affected by relocation, we re-estimate 2SLS for women's relative decision making power over six individual decisions.

Table 3 depicts the effect of relocation on changes in women's relative decision making power over each of the six decisions collected in our survey. All estimated coefficients of $Relocate$ in Table 3 are either positive or insignificantly negative, revealing that there is no evident strategic exchange of decisions between the two spouses. Furthermore, it's interesting that women's relative decision making power particularly goes up over the decision on children's education. The estimated coefficient in column 4 suggests that relocation can significantly raise mothers' relative decision making power over her children's education by almost 0.23. A number of literature has shown that women are more likely to allocate resources to public goods and services compared with men because of gendered preferences and women tend to be more altruistic (Becker, 1976; Brown, 2009; Duflo and Udry, 2004; Duflo, 2012).[12] In this case, a relative increase in mother's decision making power over her children's education could lead to more investment in children's education, which could be powerful tools to enhance her children's human capital accumulation and reduce poverty in the long-term.

Another interesting finding is that relocation has a significant positive effect on women's relative decision making power over the purchase of durable goods and construction of house (column 2 of Table 3). Taking control of decisions regarding durable goods and house is often regarded as important indicators of intra-household bargaining power which usually exclude women's participation in rural China, especially in less developed mountainous areas (Leight and Liu, 2016). Therefore, the relative increase of women's decision making over durable goods and house related decision can be considered as a sign of improvements of women's status for these poor households.

However, it seems that there is no significant improvement in women's relative decision making power over big affairs, suggesting that sampled households respond

to relocation asymmetrically over different important decisions. This may be because men have strategically ceded control of some important decisions to avoid potential conflicts with his wife, but still remain dominant in the household. The stubbornness and persistence of social norms can also be confirmed by the estimates in the first and third column, which shows that relocation doesn't have any positive effect on women's relative decision making power over the purchase of daily goods and chores. Another reason to explain the insignificant coefficient of column 1 is that women's decision making power over the purchase of daily goods is already high, meaning that there is not much space for further augmentation of this decision making power.[13]

Table 3 The effect of relocation on women's relative decision making power over six decisions

	Women's relative decision making power over decisions made on					
	purchase of daily goods	purchase of durable goods and house	chores	children's education	big affairs	grocery shopping and cook
	(1)	(2)	(3)	(4)	(5)	(6)
Relocate	0.155	0.281***	0.055	0.225***	0.051	-0.025
	(0.124)	(0.089)	(0.184)	(0.082)	(0.071)	(0.126)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Moving year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
F statistic	102.5395	102.5395	102.5395	102.5395	102.5395	102.5395
R^2	0.0233	0.0246	0.0226	0.0397	0.0519	0.0290
Adjusted R^2	0.0066	0.0080	0.0060	0.0233	0.0357	0.0125
N	1848	1848	1848	1848	1848	1848

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Standard errors clustered at the village level are reported in parentheses. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

6. Channel analysis

The previous section indicates that there is a causal effect of relocation on the increase of women's relative decision making power within households. In this section we try to get a better understanding of this causal relationship by exploring a series of potential channels through which relocation may alter women's relative decision making power. Our survey data provides us with a rich set of intermediate

[13] Our survey data has shown that 53.07% of decisions of the purchase of daily consumption goods are made by wives and 63.28% of the domestic work are mainly done by wives.

variables to be explored. Specifically, we have data on modules of employment of all household members, household assets, household finance, and distance and travel time to various institutions and public facilities. Appendix Table A3 presents summary statistics for all channel variables. Below we will examine these channels step by step.

6.1 Changes of women's absolute and relative wage income

Changes of women's absolute wage income. To investigate how changes of women's absolute wage income resulting from relocation can affect women's relative decision making power, we calculate the yearly nonfarm wage income of wife according to the employment module for all household members. Appendix Table A2 indicates that on average, women in the treatment group earns around 1280 yuan more nonfarm wage income every year than those in the control group, which equals to the third tier of monthly minimum wage in Anhui Province in 2020.

Column 1 of Table 4 replicates 2SLS estimation which specification is the same as column 5 of Table 2, while column 2 of Table 4 presents 2SLS estimation with an additional control for the logarithm of women's absolute nonfarm wage income. The result indicates that the relationship between women's absolute nonfarm wage income and her relative decision making power within households is significantly positive. One percentage greater women's absolute wage income increase is associated with an augment of 0.036 score in her relatively decision making power within households. In addition, compared with column 1 of Table 4, the estimated coefficient of $Relocate$ declines by 0.116 when we add women's absolute nonfarm wage income in column 2. This suggests that women's independent earning plays an important role in mediating the effect of relocation on her decision making power within households.

Changes of women's relative wage income. Literature on household bargaining model points to the role of gender wage gaps in affecting the status and balance of decision making power of couples (Bertrand et al, 2015; Blau and Kahn, 2017). In light of this, we further explore how changes of women's relative wage income can affect her decision making power. Specifically, we measure women's relative wage income by couple wage gap, which is calculated as wife's yearly nonfarm wage income minus her husband's yearly nonfarm wage income. Although the average

couple wage gap was negative in both treatment and control group and the average couple wage gap was bigger in the treatment group than in the control group, the difference of the couple wage gap between the two groups were insignificant. And considering the fact that couple wage gaps can be positive or negative, we separated this variable into two variables: $log(couple\ wage\ gap1)$ represents the logarithm of couple wage gap when its value is non-negative (i.e. wife earns no less than her husband), while $log(couple\ wage\ gap2)$ represents the logarithm of reverse couple wage gap when its value is negative (i.e. husband earns more than her wife).

Column 2 of Table 4 reports 2SLS estimation after controlling for the couple wage gap. We find that the estimated coefficient of $log(couple\ wage\ gap1)$ is significantly positive, indicating that women's relative wage income has a statistically direct positive effect on her relative decision making power within households when she earns more wage than her husband. When women earns less wage than her husband, however, the effect of her relative wage income is insignificant (and even negative) anymore. Turning to the mediating effect of couple wage gap on women's relative decision making power, the estimated coefficient of $Relocate$ becomes smaller conditional on couple wage gaps.

There are two main reasons to explain the decline of estimated coefficient of $Relocate$: First, empirical evidence has shown that the reduction (increase) in gender wage gaps within households increases (reduces) women's relative wage income, which in turn can improve (damage) women's decision making power within households and outside options (Danquah et al., 2020; Duflo and Udry, 2004; Lundberg et al., 1997). Second, the distribution of the share of income earned by the wife also matters a lot. (Bertrand et al., 2015). There can be a sharp change of the distribution of bargaining power within households when wife's income exceeds her husband's income. Therefore, the decline of estimated coefficient of $Relocate$ may mainly stem from households with women's wage income exceeding her husband.

6.2 Changes of farmland and household assets

A well-established literature on household bargaining also focus on the effect of another important component of women's empowerment — asset ownership (Calvi,

2020; Deininger and Castagnini, 2005; Doss, 2013). Previous evidence has shown that improving women's control over assets such as land can enhance women's economic security and bargaining power within households (Allendorf, 2007; Menon et al., 2014). In addition to the positive benefits to women's welfare, women's control over assets also has well-document benefits on human-capital outcomes for their children (Menon et al., 2014). Although our survey data cannot allow us to identify the specific ownership of asset ownership within households, these variables can also provide us with some insights about the mediating effect of asset ownership on women's decision making power. Specifically, we examine the mediating effect of two kinds of assets on women's relative decision making power: total area of contracted farmland and total present value of household assets at the end of the year.

Column 4 of Table 4 presents the 2SLS estimation result with additional control for farmland. First, there is a negative (although insignificant) correlation between farmland and women's relative decision making power. This evidence is consistent with prior literature that finds that a great deal of gender inequality has accumulated since the household responsibility system implemented in 1980s and rural women actually own less land than men in rural China (Hare et al., 2007; Zhang et al., 2004). This in turn can damage women's empowerment and well-being within households. Second, the estimated coefficient of $Relocate$ becomes essentially unchanged and a bit higher than the coefficient of column 1 conditional on the total area of farmland. While there is a negative relationship between the total area of household farmland and women's relative decision making power, the decline of the total area of household farmland arising from relocation can somewhat prohibit the deterioration of women's relative decision making power within households.

Column 5 of Table 4 reports the 2SLS estimation result of the direct and mediating effect of household assets on women's relative decision power. In contrast to the negative relationship between farmland and women's decision making power, household asset is significantly positive correlated with women's decision making power. As indicated in Appendix Table A2, the value of household assets in treatment group was 2625.93 yuan more than that in control group. These information may

reflect that the distribution of household assets have changed during and after the relocation behavior, with women taking control of more household assets. Moreover, the estimated coefficient of $Relocate$ becomes smaller with the control for household assets, suggesting that women's control of household assets and her relative decision making power maybe mutually substituted.

6.3 Access to microcredit

A number of studies on women's empowerment and welfare have focused profoundly on how microcredit affects women's empowerment (Banerjee et al., 2015; Kochar et al., 2022). Following this thread of literature, we examine the impact of access to microcredit on women's role in household decisions. Our measure of the access to microcredit is defined as a dummy variable indicating whether the sampled household has taken out microcredit loans in the last year.

Column 6 of Table 4 presents the 2SLS result of the microcredit channel. While the access to microcredit seems to have no significant direct effect on women's decision making power, it plays a prominent role in mediating the effect of relocation. Compared with column 1, the estimated coefficient of $Relocate$ declines by roughly 10 percent of what it was in the absence of conditioning on microcredit. This suggests that financial inclusion policies for poor households such as the improvement of microcredit are important channels through which the poverty alleviation relocation program can affect women's decision making power, although the microcredit may not be targeted at women (Kochar et al., 2022).

6.4 Access to counties and markets

Theory of poverty trap indicates that movements out of poverty require big push which provides poor households with better opportunities, resources, and more productive employment (Balboni et al., 2022; Banerjee, 2020; Murphy et al., 1989). Guided by this theory, we proceed to investigate whether the large-scale poverty alleviation relocation program generates a "big push" that can enhance the livelihoods of poor households and consequently affect women's relative decision making power within households. We use measures of access to market and county (which is defined as the logarithm of time to the nearest market and county,

respectively) to proxy changes of living conditions of sampled households. Compared with non-relocated households, the round-trip time taken by relocated households to travel to the nearest market and county has both declined by over 30 minutes, which is fairly high considering the average round-trip time to the nearest market and county for non- relocated households (74 minutes and 193 minutes, respectively).

Column 7 of Table 4 presents 2SLS estimate with additional controls of the access to the nearest market and county. While both access measures are negatively correlated with women's decision making power, only the change of time taken to travel to the nearest county has a direct significant effect on women's decision making power. Most importantly, when we control for the time taken to travel to the nearest market and county, the estimated coefficient of $Relocate$ becomes much smaller and insignificant any more. This indicates that sampled households have relocated to areas with better living conditions, making it more convenient for them to travel to markets and counties and thus have better access to more (potential) job opportunities. Furthermore, a number of literature has revealed that improvements of access to markets and counties can affect women and men's time allocation disproportionately (Becker, 1965; Bardasi and Wodon, 2005; Pollak and Wachter, 1975; Taryn and Rachel, 2022). In rural China, women spend much more time in both indoor and outdoor home production than men and less time in paid work. In this context, improving household's access to markets and counties can save women's time spent on home production (such as time spent on grocery shopping) and have substantial effects on the time use of women, but not of men. This can in turn lead to women's paid work propensities increase more strongly than men, thus improving their outside options and decision making power within households. In addition, a natural implication of column 7 is that disadvantaged groups can be especially responsive to new opportunities, further confirming the concept of poverty trap.

6.5 Neighborhood effect

A large literature has found persistent neighborhood effects of relocation on various outcomes, especially the intergenerational effect on children's development (Chetty et al., 2016; Derenoncourt, 2022; Nakamuran et al., 2021). By moving into

another community, or by rebuilding a new community, the relocation may affect women's intra-household decision making power through characteristics outside of their own families. For example, if the relocated neighborhood has a culture of greater gender equality, then the behavior of relocated households will converge to the behavior of its origin residents.

Column 8 reports the 2SLS estimation result of neighborhood effect which is proxied by the population density of residence. We find that the estimated coefficient of $Relocate$ becomes bigger than that in column 1 conditional on population density. This is because there is a negative relationship between population density and women's decision making power as indicated by the coefficient of population density and the population density in resettlement communities are much higher than that in origin villages. However, we should emphasize that one must be cautious in interpreting the result of neighborhood considering the relatively small sample and its inappropriate measurement.

Table 4 Channel analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relocation	0.742**	0.626*	0.689**	0.747**	0.696**	0.671**	0.529	0.769***
	(0.306)	(0.334)	(0.334)	(0.297)	(0.319)	(0.338)	(0.486)	(0.133)
Log(wage income of wife)		0.036**						
		(0.016)						
Log(couple wage gap1)			0.053**					
			(0.025)					
Log(couple wage gap2)			-0.004					
			(0.018)					
Log(farmland)				-0.116				
				(0.112)				
Log(asset)					0.047***			
					(0.012)			
Microcredit						0.207		
						(0.166)		
Log(time to market)							-0.011	
							(0.088)	
Log(time to county)							-0.151*	
							(0.084)	
Population density								-0.001*
								(0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Moving year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistic	102.5395	95.6876	92.4412	103.9761	103.4288	91.6599	44.1993	104.7265
R^2	0.0363	0.0431	0.0429	0.0370	0.0410	0.0396	0.0447	0.0538
Adjusted R^2	0.0199	0.0262	0.0255	0.0201	0.0241	0.0226	0.0273	0.0342
N	1848	1848	1848	1848	1848	1848	1840	1532

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Standard errors clustered at the village level are reported in parentheses. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

7. Heterogeneity analysis

7.1 Heterogeneous effects by relocation type

In this part, we explore several potential heterogeneous effects of the causal effect of relocation on women's relative decision making power within households. First, we investigate whether the impact of relocation varies by the relocation type. We conduct 2SLS estimation separately by the relocation type of sampled households and the regression specifications remain the same as the baseline regression. The results are presented in Table 5. We find that relocation has a significant positive

effect on women's relative decision making power for urban-relocated households. However, in contrast to the significant effects for married women of urban-relocated households, the relocation effects for married women of rural-relocated households are insignificant (although the magnitude of the effect for rural-relocated households is only slightly smaller than urban-relocated households). This is consistent with the fact that urban relocation has changed the living environment of sampled households more than rural relocation, which directly affects the extent to which relocation affects women's decision making roles.

Table 5 Heterogeneous effects by relocation type

	Urban Relocation	Rural Relocation
	(1)	(2)
Relocation	0.792**	0.723
	(0.314)	(1.255)
Controls	Yes	Yes
Household fixed effect	Yes	Yes
Moving year fixed effect	Yes	Yes
F statistic	210.1048	6.2524
R^2	0.0960	0.0513
Adjusted R^2	0.0570	0.0162
N	700	812

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Standard errors clustered at the village level are reported in parentheses. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

7.2 Heterogeneous effects by women's non-farm employment status

We then speak to the literature on household bargaining power theory by exploring whether impacts of relocation vary with wife's employment status of non-farm work. In 2019, only 17 percent of wives in our sample participated in at least one type of non-farm work. This number increased to 30 percent in 2021. Based on the household bargaining power theory, women's decision making power is determined by threat points, which are defined as the counterfactual utilities she would obtain outside of the marriage (Kim and Benjamin, 2021; Manser and Brown, 1980). Therefore, married women may be affected by changes of job opportunities resulting from relocation even if they do not participate in non-farm work. To test this, we

introduce an interaction term of $Relocation$ and wife's non-farm employment status in our model.

The estimated result reported in column 2 of Table 5 confirms the bargaining power theory. The estimated coefficient of $Relocation$ suggests that for married women who did not participate in the non-farm work during the period of our analysis, relocation can significantly increase their relative decision making power within households by 0.596 score. The estimated coefficient of the interaction term is also significantly positive, showing that the positive effect of relocation on women's relative decision making power for married women who participated in the non-farm work is larger than those who did not participate in the non-farm work. In addition, to provide more robustness evidence in support of the bargaining power theory, we also control the interaction term of $Relocation$ and husband's nonfarm employment status and replicates the analysis using the samples in columns 3. This inclusion has almost no effect on the coefficient estimates compared with column 2.

Table 6 Heterogeneous effects by employment and migration status

	(1)	(2)	(3)	(4)
Relocation	0.596*	0.631*	0.746**	0.778**
	(0.327)	(0.366)	(0.309)	(0.324)
Relocation×FemaleEmployment	0.358**	0.373**		
	(0.169)	(0.173)		
Relocation×MaleEmployment		-0.065		
		(0.186)		
Relocation×FemaleMigrant			-0.069	-0.022
			(0.270)	(0.288)
Relocation×MaleMigrant				-0.155
				(0.229)
Controls	Yes	Yes	Yes	Yes
Household fixed effect	Yes	Yes	Yes	Yes
Moving year fixed effect	Yes	Yes	Yes	Yes
F statistic	47.8097	30.1390	50.7252	32.9443
R^2	0.0428	0.0426	0.0365	0.0373
Adjusted R^2	0.0270	0.0263	0.0206	0.0208
N	1844	1844	1844	1844

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Column 2 and 4 additionally control for the employment status of the husband and whether the husband was a migrant, respectively. Standard errors clustered at the village level are reported in parentheses. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

7.3 Heterogeneous effects by women's migration status

As poor households relocate to locations with better access to counties and transportation, the possibility of out-migration of household members may also increase significantly. Without relocation, it is commonly assumed that male rural labor force are more likely to migrate to urban areas and women will take over more agricultural production, which could enlarge gender wage gap and hamper women empowerment (de Brauw et al., 2021). However, in the context of relocation where farmland was reduced (as shown in Table A2), women will also respond to migration as actively as men. Therefore, we include the interaction term of $Relocation$ and wife's migration status $FemaleMigrant$ in column 4 of Table 5, and additionally include the interaction term of $Relocation$ and husband's migration status $MaleMigrant$ in column 5 of Table 5.[14]

As can be observed from column 4, relocation is positively associated with women's relative decision making power for non-migrant wives. However, the interaction effect of relocation and women's migration status is both negative and insignificant. This pattern keeps basically unchanged when we further introduce the interaction term of $Relocation$ and $MaleMigrant$. In addition, husband's migration has more negative effect on his wife's decision making power within households. This can be explained by the migration pattern shown in Table A4: although the proportion of migrants increased for both wives and husbands, the increased size was extremely small and it accounted for a small proportion in our sample. In other words, relocation affects women's relative decision making power mainly through providing local job opportunities, rather than stimulating people to migrant.

[14] $FemaleMigrant$ is defined as a dummy variable: if the wife's place of non-farm employment is in another county, another province or abroad, then $FemaleMigrant$ equals to one; otherwise, if the wife's place of non-farm employment is in her own village, another village, or another county, then $FemaleMigrant$ equals to zero. $MaleMigrant$ is also defined in the same way.

8. Conclusion

This paper provides empirical support for the hypothesis that improvements in women's decision making ability require big push in their livelihood, which is consistent with the prediction of the poverty trap theory. Our paper is based on a longitudinal survey of China's Poverty Alleviation Relocation Program. This program aimed to relocate poor households in inhospitable areas to better locations, providing them with better access to job opportunities and local infrastructure. Employing variation in the phased time of relocation across villages, we identify the causal effect of relocation using an IV strategy. Our baseline regression reveals a significant positive effect of relocation on women's relative decision making power within households, suggesting that relocation can significantly improve women's decision making power of non-relocated households from -3.357 to -2.617. Our robustness check results also find strong evidence that policy-induced relocation indeed enhance women's decision making role within households.

We find that relocation can affect women's decision making power via three channels: First, relocation provides more job opportunities for relocated households and many of them are targeted at the women group, this can increase the absolute non-farm wage income of wives. Wife's relative non-farm wage income can also affect her decision making power conditional on the fact that she earns more non-farm wage than her husband. Second, relocated households can have better access to microcredit through relocation, although the microcredit may not be targeted at women. Third, relocation can improve household's access to the nearest counties, which could save women's time spent on home production and have substantial effects on her time allocation. This can in turn lead to women's paid work propensities increase more strongly than men, thus improving their outside options and decision making power within households.

Our results have significant implications for policy, highlighting the need to pay attention to the consequential effects of such relocation programs in developing countries. While policies that incentivize households to move to opportunity have been debated for decades in the developed world, this is rare in developing countries.

Furthermore, our results also suggest the need to vigorously adopt policies that both increase the quantity and quality of jobs for poor women and address gender barriers that inhibit women from accessing these jobs such as heavy burdens on chores.

Appendix

Table A1 Determinant of relocation timing of villager groups

	Relocation year
Log (Population)	-0.054
	(0.162)
Percentage of religious population	-0.003
	(0.008)
Elevation	0.000
	(0.000)
Log (Area)	0.006
	(0.040)
Number of disasters	-0.002
	(0.022)
Whether has 4G signal	-0.225
	(0.325)
R^2	0.0058
Adjusted R^2	-0.0324
N	163

Note: Standard errors clustered at the village level are reported in parentheses. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

Table A2 Robustness to alternative indices of women's relative decision making power

	PCA	Mean index	Omit children's education	Omit chores and grocery shopping	Decisions made by others
	(1)	(2)	(3)	(4)	(5)
Relocate	0.211**	0.124**	0.533*	0.710***	1.611**
	(0.084)	(0.051)	(0.282)	(0.243)	(0.741)
Controls	Yes	Yes	Yes	Yes	Yes
Household fixed effect	Yes	Yes	Yes	Yes	Yes
Moving year fixed effect	Yes	Yes	Yes	Yes	Yes
F statistic	102.5395	102.5395	105.8528	102.5417	70.7873
R^2	0.0465	0.0363	0.0308	0.0440	0.0403
Adjusted R^2	0.0303	0.0199	0.0146	0.0278	0.0085
N	1848	1848	1888	1854	936

Note: The set of controls includes characteristics of couples, households and interviewees as described in Section 4. Standard errors clustered at the village level are reported in parentheses. Column 1 uses principal component analysis to calculate the decision making index. Column 2 uses the mean index for the six decision items of this paper. Column 3 omits decisions over children's education which response rate is below 90% to calculate the index. Column 4 omits decisions over chores as well as grocery shopping and cooking to calculate the index. The last column only considers observations that all decision items are made by couples instead of other household members. The F statistic is the Kleibergen-Paap Wald F statistic of the weak instrument test. The significance levels of 1%, 5%, and 10% are denoted by ***, **, and *, respectively.
Data source: author's survey data.

Table A3 Summary statistics of channel variables

Variables	Definition	Full sample	Treatment group	Control group	Difference
		(1)	(2)	(3)	(4)=(2)-(3)
Nonfarm wage income of wife	Yearly wage income (Yuan)	4176.911	4382.02	3103.030	1278.989**
		(9489.519)	(9556.277)	(9072.040)	(600.353)
Nonfarm wage income of husband	Yearly wage income (Yuan)	9781.466	10083.18	8201.784	1881.396**
		(15147.109)	(9556.277)	(9072.040)	(958.457)
Nonfarm wage gap between couples	Nonfarm wage income of wife minus nonfarm wage income of husband	-5604.555	-5701.161	-5098.755	-602.407
	(Yuan)	(14696.298)	(15160.160)	(15005.070)	(930.793)
Farmland	Total area of farmland in origin village and resettlement community (Mu)	10.879	10.499	12.874	-2.376***
		(11.814)	(11.623)	(12.602)	(0.747)
Asset	Total present value of consumption assets and productive assets (Yuan)	11233.535	11654.648	9028.722	2625.925**
		(18753.136)	(18963.620)	(17475.170)	(1186.299)
Microcredit	Whether have microcredit: 1=Yes, 0 otherwise	0.160	0.167	0.121	0.046**
		(0.367)	(0.373)	(0.327)	(0.023)
Round-trip time to the nearest market	Minutes	45.003	39.494	73.773	-34.279***
		(55.971)	(50.257)	(73.024)	(3.455)
Round-trip time to the nearest county	Minutes	164.117	158.629	192.780	-34.151***
		(132.419)	(135.017)	(113.905)	(8.351)
Population density	Average population per floor area (person/m^2)	65.234	77.034	0.263	76.77***
		(131.995)	(140.286)	(3.783)	(8.788)
N		1852	1555	297	

Note: Standard deviations (column 1, 2, 3) and standard errors (column 4) are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Data source: author's survey data.

Table A4 The employment status of our sample

	Total (N)	N. of non-farm worker	N. of non-farm worker/Total	N. of migrants	N. of migrants/Total
Wife's employment status					
2019	926	156	16.85%	69	7.45%
2021	924	277	29.98%	88	9.52%
Total	1,850	433	23.41%	157	8.49%
Husband's employment status					
2019	926	337	36.39%	155	16.74%
2021	924	474	51.30%	182	19.70%
Total	1,850	811	43.84%	337	18.22%

Data source: author's survey data.

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