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**Engaging Information Technology in Farmland Rental Market:
An Empirical Study from Rural China**

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Engaging Information Technology in Farmland Rental Market: An Empirical Study from Rural China

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Abstract

Farmland rental market plays an important role in China. This study investigates the internet's influence on leasing out of the farmland by rural households. The study is based on the 2018 China Family Panel Studies (CFPS) survey data and a binary logit model to explore the influence of internet use from four aspects, including whether use the internet, the mode, the time and the frequency of internet use grouped by different purposes. Findings show that household heads who use the internet are more likely than non-users to lease out farmland. More intense internet use (more hours) is directly correlated with internet use in the farmland rental market. Using the internet via mobile phone has a more significant impact on leasing out farmland than using it via computers. Further analysis shows that internet use significantly promotes rural households' social networks and increases their likelihood of engaging in non-farm employment and business activities, thus contributing to farmland rental decisions. The government should improve the information infrastructure and provide skills training in information management in rural areas to promote farmland rental activities.

Keywords: internet use, farmland rental, renting-in, renting-out, internet use frequency, time spent

1. Introduction

Information and communication technology development in the 20th century has been a boon for many countries' economic growth and development. The development and use of digital information systems such as mobile phones, smartphones, tablets, and computers have increased rapidly. Many countries, including China, are focusing on increasing rural

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households' access to the internet. According to the latest Statistical Report on the Development of Internet in China released by the China Internet Network Information Center (CNNIC)¹, there were 0.284 billion internet users in rural China by the end of 2021, accounting for 27.6 percent to total internet users in China. However, based on the report of 2020 population census of China², there were 0.5098 billion rural population in China, accounting for 36.4 percent to total population of China. Compared the two percentages, we can find that still many farmers did not have access to the internet. Therefore, the internet usage behavior of farmers deserves to be noticed.

As noted by Lio and Liu (2006), such technology has changed significantly the way farmers communicate and obtain information when it comes to farming. Many studies have documented the contribution of internet use to household income (Ma et al., 2020a), personal satisfaction (Hong and Chang, 2020), agricultural extension service delivery (Fu and Akter, 2016), smart farming, and application to supply chains, etc. (Wolfert et al., 2017). Farmers in many developing and emerging economies like China face several challenges in seeking information on farming and enterprise management. The problem becomes paramount for smallholders in remote villages because information asymmetry and distortion make it challenging to ensure the effective and efficient use of resources (Zheng et al., 2021). Resources like the land are critical to Chinese farmers for living and food security of them and China in general. Access to and use of information and communication technology like the internet reduce barriers to information gathering, improve information quality and search

¹ Source: <http://www.cnnic.cn/hlwfzyj/hlwxyzbg/hlwtjbg/202202/P020220407403488048001.pdf>.

² Source: <http://www.stats.gov.cn/tjsj/pcsj/rkpc/d7c/202111/P020211126523667366751.pdf>.

functionality, and enhance farmers' productivity (Aker, 2011; Casaburi et al., 2014; De Silva and Ratnadiwakara, 2008; Deichmann et al., 2016; Zanello, 2012).

Although substantial research on the benefits of internet use to rural households has been carried out recently, the impacts of internet use on the farmland rental markets have received much less attention. To our knowledge, the only two studies that focus on the relationship between information and communication technology and the land market are Stoyneva (2008) and Yang et al. (2015). The study by Stoyneva (2008) put forward a concept for e-service to solve problems in the land market in Bulgaria. Similarly, Yang et al. (2015) suggested a web-based service-oriented, geographic information system (GIS) to provide land price information services. Indeed, since 2015 China has led a concerted effort to carry out Internet+ demonstration projects³ and to train farmers in mobile phone application skills to enhance internet use. It remains to be explored whether the popularity of the Internet and the accelerated speed of information exchange and dissemination will have an impact on farmland rental markets.

The development of the farmland rental market plays an increasingly important role in countries where rural households lack private property rights to farmland, such as in China. Since the 1984 inception of the household contract responsibility system, most farms in China are small, and parcels are fragmented. Additionally, small family farms are still fundamental to Chinese agrarian production. For example, China's 2016 national agricultural census found that about 207 million rural households operate farms and cultivate about 140

³ Refers to the integration of the internet and innovative information technologies. Source: Central People's Government of the People's Republic of China, The State Council on actively promoting the "Internet +" action of the guiding opinions(State Development [2015] No. 40), http://www.gov.cn/zhengce/content/2015-07/04/content_10002.htm.

million hectares.⁴ Rural Chinese households are assigned and have the original rights to contract for and operate farmland, but not to ownership of the farmland (Wang and Zhang, 2017). The only path to transform smallholder farms into large-scale farms is to lease in farmland. Thus, if the Chinese government's goal is to increase agricultural productivity, and if economies of scale are key to achieving that goal, farmland rental activities need to be encouraged. However, the China's land rental rate is low because of various reasons (Zhu et al., 2021b). To that end, the Chinese government has promoted the development of information and communication technology in rural areas and has encouraged the adoption of such technology to narrow the urban-rural digital divide. In the case of missing or incomplete information about the availability of farmland to rent, information and communication technology can be a beneficial platform for farmland rental activity.

Turning to the factors affecting rural households' participation in farmland rental activities, existing literature argues that rural households' participation in the farmland lease market can be attributed to differences in rural households' age, gender, education, income(Jiang et al., 2019), off-farm employment, and related land-use policies (Andreas and Zhan, 2016; Che, 2016; Kung and Kung, 2002). Otherwise, borrowing from informal sources, household labour availability, percentage of total income from agricultural sources, and the presence of village cadre significantly and positively influence farmland transfer-in(Jiang et al., 2018). A suitable rent control regime or contract enforcement may also promote the rate of farmland transfer in China(Zhu et al., 2021a). However, the role of information and communication technology in the farmland rental market has been neglected. This technology

⁴ Source: http://www.stats.gov.cn/tjsj/tjgb/nypcgb/qgnypcgb/201712/t20171214_1562740.html.

provides information on and knowledge of farming activities, crop production techniques, extension services, and input usage. It also helps facilitate communication about renters — those wanting to rent in farmland and those wishing to rent out farmland — thus encouraging farmland rental activity.

Hence, this study aims to examine the impact of the use of information and communication technology, such as internet use by rural Chinese households on farmland leasing activities. The study uses 2018 China Family Panel Studies (CFPS) survey data and a binary logit model controlling the village fixed effects. Measuring the impact of information and communication technology's use in the farmland rental market is critical for at least three reasons. Firstly, technology such as the internet plays a crucial role in lowering transaction costs (Aker, 2011; Hobbs, 1996). Secondly, internet use helps smallholders gather information on market conditions, prices, and production practices. Improved and faster access to information could increase farmers' bargaining power and participation in the land rental market and erase any asymmetrical information (Zanello and Srinivasan, 2014; Zhu et al., 2021c). Thirdly, using technology such as the internet increases the social network capacity, income, and wellbeing of rural farmers (Wellman et al., 2001).

This study's contribution to the literature is three-fold. Firstly, the study highlights the effects of internet use on the farmland leasing market by empirical evidence based on a national survey dataset, which is especially important given the increasing rate of internet use in rural China. Secondly, the study defines internet use via multiple variables, including whether the rural households use the internet, the mode of internet use, the time spent on the internet, and the frequency of internet use for various purposes. Analysis using robust

definitions helps provide a new perspective in explaining the internet use behavior of rural Chinese households. Thirdly, the study further explores the mechanism of how internet use influences farmland leasing activity, which may help deepen understanding of rural households' internet use behavior and provide valuable information to policymakers.

The next section provides the background and literature review. Section 3 describes the data and variables. The estimation strategy is presented in Section 4. Section 5 reports the results and provides a discussion. We conclude the study and discuss policy implications in Section 6.

2. Background and Literature Review

2.1 Background

According to the 49th Statistical Report on the Development of Internet in China released by the China Internet Network Information Center (CNNIC)⁵, there are 1.03 billion internet users in China by the end of 2021, and the internet usage rate reached 73.0 percent of the population. Among China's internet users, 27.6 percent are rural residents. Turning to the equipment used for internet access, the proportion of internet users who use a mobile phone is 99.7 percent, desktop computers 35.0 percent, laptops 23.0 percent, television 28.1percent, and tablet personal computers 27.4 percent. The rapid growth in internet usage is due to implementing several government policies and strategies. These include the 2019-2025 Plan for Digital Agriculture and Rural Development, the 2020 Key Points of Digital Rural

⁵ Source: <http://www.cnnic.cn/hlwfzyj/hlwxyzbg/hlwtjbg/202202/P020220407403488048001.pdf>.

Development, Notice on the Pilot Work of National Digital Village,⁶ “Internet Plus Agriculture” and “Rural e-commerce” strategies (Hong and Chang, 2020; Ma et al., 2020a).

Internet usage has grown, but farmland transfer in rural China faces many challenges. Though the Chinese government has promoted farmland rental to achieve “appropriate-scale” farming and overcome the disadvantages of smallholder farming, the scale of farmland leasing is small. According to the Abstract of China Agricultural and Rural Statistics released by the Ministry of Agriculture and Rural Areas of China, 40.07 percent of farmers leased farmland at the end of 2019⁷. Similarly, a 2019 survey of more than 900 cash-crop farms in four provinces (Hebei, Shaanxi, Hubei, and Yunnan) showed that only 3 percent of landholdings were leased, and very few rural areas households are leasing land to new operators (Rogers et al., 2021). What’s worse, the vast majority of respondents planned to continue farming the same amount of land in the near future. In this case, actions to boost farmland transfers are needed.

2.2 Literature Review

Many studies have investigated information and communication technologies (Colombo et al., 2013) as primary drivers of productivity gains and economic growth (Lio and Liu, 2006; Ma et al., 2020b; Tadesse and Bahiigwa, 2015). Internet use, an information and communication technology, attracts more attention due to its consequences for social, political, and economic development, especially for rural households and farming. Internet use not only improves rural households’ access to financial services (Munyegera and

⁶ Source: <http://www.moa.gov.cn/nybggb/2020/202002/202004/P020200410025352792903.pdf>.

⁷ Source: <http://zdscxx.moa.gov.cn:8080/misportal/public/publicationRedStyle.jsp?key=%E4%B8%AD%E5%9B%BD%E5%86%9C%E4%B8%9A%E7%BB%9F%E8%AE%A1%E8%B5%84%E6%96%99>.

Matsumoto, 2018) and to input and output markets (Negi et al., 2018), it significantly increases the profits of agricultural production and the sale of agricultural commodities (BIRTHAL et al., 2015; Jensen, 2007; LIO and LIU, 2006). Internet use is conducive to promoting the development of green agriculture by reducing the intensity of fertilizer usage (Yuan et al., 2021) and the amount of chemical fertilizer (Zhao et al., 2021). Regarding the mechanism analysis of internet usage, previous studies indicate several channels by which the use of the internet influences rural households. Firstly, internet use provides an informative platform (Wyckhuys et al., 2017). Rural families who frequently use the internet are more receptive than their urban counterparts to external information and study relevant techniques, policies, and new technologies (Mittal and Tripathi, 2009). Secondly, internet use increases rural households' human capital (Yuan et al., 2021). Thirdly, internet use enhances rural households' capability for e-commerce sales and information collection (Zhao et al., 2021). However, there is little evidence on how internet use influences rural households' farmland rental activities.

The literature uses several ways to measure families' internet use. Internet use is defined as a binary variable, taking a value of 1 if the household has access to broadband internet, 0 otherwise (Ma et al., 2020b; Zheng et al., 2021). Other studies have used information on household-level mobile phone ownership (a value of 1 if the household has access to a mobile phone, 0 otherwise, (Tadesse and Bahiigwa, 2015); information on whether the household uses the internet or a cellphone (Yuan et al., 2021); and information on whether the family is an internet user or non-user (Ma et al., 2020c). However, it should be noted that the questions of "Do you have access to the internet" or "length of use" cannot

reflect the difference in internet use and the gap in the ability of application (Ho and Tseng, 2006). Only a few studies further consider additional features of internet usage. For example, Beard et al. (2012) grouped internet use into three types: dial-up internet use at home, broadband internet use at home, and internet use in public settings. Several studies also have considered the frequency of internet usage (Cuihong and Chengzhi, 2019). Other studies have considered internet usage and its purpose (communication, purchase of agricultural materials, access to agricultural knowledge and technology, agricultural sales, etc.) to understand the role of internet usage (Zhao et al., 2021). Given the research gap mentioned above, this paper explores the relationship between internet usage and rural households' farmland rental activities using household-level data.

3. Data and Description

3.1 Data

We use a dataset from the 2018 wave of the China Family Panel Studies (CFPS) launched by Peking University⁸. CFPS is a nearly nationwide, comprehensive, longitudinal social survey in contemporary China (Xie and Lu, 2015). The baseline survey was conducted in 2010, covering 25 provinces of mainland China and a sample size of 14,798 families chosen to represent 95 percent of the Chinese population. The distribution of sampled provinces (municipalities/ autonomous regions) is reported in Appendix Table A1. The follow-up survey in 2018 interviewed 15,000 households (families). The panel studies used a multi-stage probability strategy for sampling. There are three stages: firstly, drawing counties or

⁸ Peking University Open Research Data, China Family Panel Studies (CFPS).
<https://opendata.pku.edu.cn/dataset.xhtml?persistentId=doi:10.18170/DVN/45LCSO>.

administrative equivalents such as districts, from five subsamples except for Shanghai, since Shanghai is quite different from other large provinces; secondly, drawing communities in selected counties or districts; thirdly, drawing households from a sampled community. Excepted for the division of urban and rural areas, a continuously measured socioeconomic indicator (SEI) was used whenever possible for implicit stratification. The indicator consists of the local per capita gross domestic product, the percentage of the non-agricultural population, and population density. About 9,276 households are regarded as rural households. Note that we are interested in assessing the influence of internet use on rural households' choice of renting out farmland, implying that the rural household has operating rights to the farmland. Thus, we exclude rural families with no farmland, resulting in a valid sample of 7,324 rural households.

3.2 Description of internet use

Farmland rental includes the leasing in and the leasing out of agricultural land. This study focuses only on leasing out of farmland for two reasons. First, rural households leasing out farmland is crucial for the farmland rental market. Second, rural households have more information advantages in leasing out farmland than leasing in farmland. Generally, rural households are more familiar with the quality of their farmland than the quality of others' farmland. Finally, information and communication play a more significant role in leasing out than leasing in farmland. Usually, rural households, as smallholders, need to obtain information from tenants to lease out their farmland. However, agricultural operators who need to lease in farmland on a large scale often negotiate directly with village committees. Considering that families decide whether to lease out or lease in farmland, we take the

characteristics of household heads into account, following previous literature (Zou et al., 2020a).

We use the internet use pattern of the head of rural households to represent rural households' internet use. In this study, internet use is measured by four variables: (1) whether the household head used the internet; (2) the mode of internet use—cellphone, computer, or both; (3) the time spent on the internet per week; (4) the frequency of internet use⁹ for various purposes, including study, work, social communication, entertainment, and business. The description of household heads' pattern of internet use is shown in Figure 1 and Table 1. Previous studies have examined factors affecting rural households' participation in the farmland lease market, including household head characteristics, off-farm employment, agricultural subsidies, regional features, and others (Che, 2008; Huang and Ding, 2016; Kung and Kung, 2002). This paper considers the household head's demographic characteristics (age, gender, education, and marital status) and the household characteristics (family size, health, durable household goods, per capita net household income, and wage income). The descriptive statistics of variables used in this paper are reported in Table 2. Table A2 in Appendix shows the difference between internet use and household characteristics

4. Estimation Strategy

The first step is to explore the effect of internet use on rural households' choice of leasing out farmland. The model of the farmland leasing-out equation can be specified as:

$$Y_{ij} = \alpha_0 + \alpha_1 internet_{ij} + \alpha H_{ij} + V_j + \mu_{ij} \quad (1)$$

Where Y_{ij} denotes whether rural household i living in village j leased out farmland.

$internet_{ij}$ refers to the internet use by the rural household head, and H_{ij} refers to a vector

⁹ 1 = never, 2 = one time in several months, 3 = once a month, 4 = two to three times a month, 5 = once or twice a week, 6 = three to four times a week, and 7 = almost every day.

of explanatory variables (characteristics of the rural household) that affect the rural household's choice of leasing out farmland. V_j is the village fixed effects which capture village specific heterogeneity. α_0 is the constant term, and α_1 and α are unknown parameters to be estimated. μ_{ij} is a random error term that captures unobservable and omitted factors that affect the selection of leasing out farmland. Since rural households' choice of leasing out farmland is a binary variable whose value equals 1 if the household leases out farmland and 0 otherwise, a binary choice model is used. We apply a logit model to estimate the influence of internet use on leasing out farmland, and the following equation can calculate the probability of leasing out farmland:

$$p \equiv P(Y_{ij} = 1|X) = F(X, \alpha) = \varphi(\alpha X) \equiv \frac{\exp(\alpha X)}{1 + \exp(\alpha X)} \quad (2)$$

After that, we calculate the odds ratio (relative risk) using the following equations:

$$1 - p = P(Y_{ij} = 0|X) = \frac{1}{1 + \exp(\alpha X)} \quad (3)$$

$$\frac{p}{1-p} = \exp(\alpha X) \quad (4)$$

The second step is to allow a heterogeneity discussion on different groups of rural households. Given that age, education of rural households, and household income are potential determinants of internet use and are associated with marginal benefits of internet use (Ma et al., 2020a; Yuan et al., 2021; Zheng et al., 2021), we further investigate the influence of internet use on rural households' choice of leasing out farmland based on subsamples grouped by the household heads' age and education and the per capita net household income.

The final step is to explore further the mechanism of internet use influencing farmland rental activity. Previous studies have indicated that internet use can strengthen public connections and lead to substantial social benefits, particularly in job searches (Beard et al., 2012), and to social capital in identifying new business opportunities (Bhagavatula et al.,

2010; Grover and Saeed, 2004). Therefore, we assume that internet use may help rural households expand their social networks, providing more information about the farmland and labor markets. Internet use also brings a large amount of timely and updated information, which may help rural households engage in off-farm activities. The information on off-farm activities, in turn, may influence rural households' choice of farmland transfer. To test our conjecture, we analyze the influence of internet use on gift expenditures, off-farm employment, and self-employed business.¹⁰ Since gift expenditures refers to a continuous variable, we use the OLS model for estimate. While off-farm employment and self-employed business are binary variables, we use a binary logit model.

5. Results and Discussion

5.1 Baseline results: impact on farmland leasing out

Table 3 and Table 4 present estimates of internet users' impact on the leasing out of farmland with the corresponding odds ratio. The upper part of Table 3 shows that internet use significantly and positively relates to rural households' selection of leasing out farmland. Specifically, the odds ratio reveals that internet users are 40% more likely than non-internet users to lease out farmland. A possible reason is that internet use helps rural households reduce the costs of looking for jobs (Weber and Mahringer, 2008), which encourages them to engage in off-farm jobs and lease out their farmland. Rural households that use mobile phones to access the internet or use mobile phones and computers simultaneously to access the internet are more likely to lease out farmland than non-internet users. This may be because rural households generally use mobile phones to access the internet, far more than

¹⁰ These data correspond to the questions asked in the survey: (1) In the past 12 months, what was the total amount of money your family spent on gifts for social relations (expenditure on gifts)? (2) In the past 12 months, did you engage in an off-farm job (off-farm employment)? (3) In the past 12 months, did any of the family members engage in self-employed business (individually operated business or private enterprises)?

they use computers to access the internet¹¹. The amount of time spent using the internet is also significantly and positively related to the probability of leasing out farmland, suggesting that an additional hour spent on the internet increases the likelihood of leasing out farmland by 1%. As Shah et al. (2002) pointed out, time spent using the internet would increase community engagement, so rural households that spend more time on the internet will get more information that may help them lease out farmland.

Results of households' characteristics reveal that the age of household head also has a significant and positive effect on the choice of leasing out farmland, indicating that an extra year of age leads to about a 1% increase in the likelihood of leasing out farmland. This is reasonable because aging significantly impacts farm activities as farmers' health and capacity for farm work declines. Older farmers are looking to leave farming and implement strategies to reduce the intensity of their work and the time they spend on farming (Jansuwan and Zander, 2021). However, the household head's gender has a negative and significant impact on the leasing out of farmland. The odds ratio suggests that male-headed households are about 80% less likely to lease out farmland than female-headed households. This result is consistent with our previous study (Zou et al., 2020b).

Similarly, marital status has a negative and significant effect on the leasing out of farmland. The result of the odds ratio reveals that unmarried household heads are about 61.2% more likely than married household heads to lease out farmland. A possible reason is that rural households who are not married are more likely to leave the village to work in the

¹¹ Based on the 49th Statistical Report on the Development of Internet in China released by the China Internet Network Information Center (CNNIC), the proportion of Chinese internet users using mobile phones to access the internet is as high as 99.7%, while the proportion using desktop computers, laptops, and tablets is 35.0%, 23.0% and 27.4%, respectively.

city. An increase in family size also negatively influences the decision to lease out farmland, suggesting that an additional family member decreased the probability of leasing out farmland by approximately 9.3%. It makes sense that more family members can cultivate more farmland, which reduces the likelihood of leasing out farmland. Finally, household heads who reported medium healthy, relatively healthy, or very healthy are less likely to lease out farmland than their counterparts. Generally, healthier household heads are more likely than less healthy household heads to have strength, stamina and stronger work capacity to engage in farming.

The results indicate that rural households with a higher percentage of older members, higher per capita net household income, and higher share of wage income in total income are more likely than those with a higher percentage of younger members, lower per capita net household income, and a low share of wage income in total income to lease out farmland. The odds ratios suggest that a one-unit increase in the percentage of elderly members increases the probability of leasing out farmland by 123%. A 1% increase in the per capita net household income (in natural logarithm) increases the likelihood of leasing out farmland by approximately 19%. Moreover, a 1% increase in the share of wage income to total household income increases the probability of leasing out farmland by about 0.3%. These results are similar to previous literature like Kung and Kung (2002), Che (2016) and Huang et al. (2012), which found that rural households with active participation in off-farm activities and good economic status tend to lease out farmland.

Table 4 shows impact of the frequency of internet use for different purposes on leasing out farmland. The estimates suggest that household heads who use the internet for

work, social communication, entertainment, and business are more likely than non-users and those using the internet only for study to lease out farmland. The odds ratios reveal that an increase in the frequency of internet use for work, social communication, entertainment, and business increases the likelihood of leasing out farmland by approximately 5.9%, 8.5% , 8.5% and 13.6%, respectively. These results may be due to several reasons. First, household heads who use the internet for work or business may obtain higher income from electronic commerce activities (Fabritz, 2013), especially under Taobao, a Chinese online shopping platform (Lin et al., 2016). Second, household heads who use the internet for social communication or entertainment may receive a lot of information (Atasoy, 2013), promoting the transfer of surplus laborers from rural areas to urban areas. Finally, the internet also provides a wealth of information and ways to socialize (Tsai, 2001), strengthening the dissemination of information on the farmland transfer market. All these approaches may encourage rural households to lease out their farmland.

The results of other controlling variables are similar to the results reported in Table 3. In other words, an increase in the age of household heads, in the share of the elder members, in per capita net household income, and in wages' share of household income increases the likelihood of leasing out farmland. However, male, married, and healthy household heads are less likely to lease out farmland than other households. Rural households with larger families also are less likely than smaller families to lease out farmland.

5.2 Heterogeneity analysis

To investigate the different effects among various groups of rural households, we provide a heterogeneity analysis by the household head's educational attainment, by the household

head's age, and by household income. The results are presented in Table 5, Table 6, and Table 7, respectively. Table 5 shows the estimates of internet users' impact on the decision to lease out farmland by three educational attainment categories — primary school or less, junior high school, and senior high school or above. The influence of internet use on decisions to lease out farmland did not differ significantly among rural household heads with different levels of education. However, we find that household heads with primary school education or below who simultaneously use mobile phones and computers to access the internet are more likely than those with similar education who use only mobile phones or only computers to lease out farmland. The corresponding odds ratio indicates that rural households with primary school education or below who use the internet are 2.627 times more likely to lease out their farmland than those with similar education who do not use the internet. There is also a positive and significant relationship between the time households with lower education levels spend on the internet and the probability of leasing out farmland. The odds ratio suggests that an additional hour that household heads in this group spend on the internet increases the probability of leasing out farmland by 1.6%. Finally, an increased frequency of internet use for entertainment and business increases the likelihood of leasing out farmland by 10.8% and 26.6%, respectively. A possible reason is that rural household heads with lower education may be more dependent on agriculture for a living, so the internet is more likely to play a significant role in their decision-making regarding farmland leasing than it plays among households with higher education.

Table 6 reports the estimates of internet use's impact on the decision to lease out farmland in four subsamples categorized by the age of household head — age 18-43, age 44-

52, age 53-63, and over age 63. Results suggest that the impact of the frequency of internet use on farmland leasing varies by the household head's age. For example, the frequency of internet use for a business purpose significantly increases the probability of leasing out farmland among young rural households (age 18-43) by 13.6%. A prior study by Ma et al. (2020c) found that younger farmers are more likely to adopt e-commerce in rural China by 20.4%, than older farmers. Thus, young rural households who use the internet may prefer to engage in e-commerce and lease out their farmland. The frequency of internet use for entertainment significantly raises the likelihood of leasing out farmland among middle-aged rural households (age 44-52) by 11.4%. The frequency of internet use for social communication significantly contributes to the leasing out of farmland by older rural households (age 53-63) by 12.2%. However, the frequency of internet use for study negatively affects the choice of leasing out farmland by rural households with a head over age 63 (by 60.8%).

Table 7 reports the estimates of internet use's impact on the decision to lease out farmland in four subsamples categorized by per capita net household income—0-6,500-yuan, 6,500-11,890 yuan, 11,890-20,440, and 20,440-330,000 yuan. Specifically, we use the per capita income quantiles. Unlike the previous results, internet use plays a relatively different role among rural households with different per capita incomes. As shown at the top of Table 7, whether household heads used the internet significantly and positively affects decisions on leasing out farmland of only the two groups with higher per capita net income. Internet use increases the likelihood of leasing out farmland by rural households with high-middle incomes (per capita net income of 11,890 to 20,440 yuan) by 59.2% and by rural households

with high incomes (per capita net income of 20,440 to 330,000 Yuan) by 66.8%. One possible reason is that internet information is more beneficial to affluent rural households than to poor rural households. The research of Ma et al. (2020c) also indicates that receiving remittances relaxed farmers' financial constraints and allowed them to invest in e-commerce businesses. Thus it is expected to affect their selection of leasing out farmland positively.

The use of mobile phones to access the internet significantly increases the likelihood of leasing out farmland by families with high middle incomes by 69.7%. In contrast, middle-income households (per capita net income of 6,500 to 11,89 yuan) whose household head simultaneously uses mobile phones and computers to access the internet are 4.736 times more likely to lease out their farmland than those who do not use the internet. The results reveal that compared with high-income groups, low-income groups need a more comprehensive range and more channels of internet applications to use it for farmland rental activities.

The frequency of internet use for various purposes makes no difference in the choice of farmland leasing out for low-income families (per capita income below 6,500 yuan). Among the remaining household groups, the increase in the frequency of household heads' internet use for social communication and entertainment has positive and significant impacts on leasing out of farmland by approximately 10% to 14%. Among middle-income households (per capita net income of 6,500 to 11,890 yuan), an increase in the frequency of household heads' internet use for work increases the likelihood of leasing out farmland by 18.5%. Among higher middle-income families (per capita net income of 11,890 to 20,440 yuan), an increase in the frequency of internet use for businesses increases the likelihood of leasing out farmland for by 21.8%. In short, internet use is more likely to promote the leasing out of

farmland by high-income rural households.

5.3 Mechanism analysis

The ever-expanding use of the internet has been penetrating social fabrics worldwide, and China is no exception. The expansion of social networks influences the transmission of information on the farmland rental market and the labor market. We consider three channels to explain rural households' use of the internet and their leasing out of farmland. Firstly, internet use can expand rural households' social networks by connecting people and thus providing information on farmland rental markets. We use the total money that rural households spent on gifts for social relations (gift expenditures) in the past 12 months as a proxy for social networks. Secondly, internet use provides a wealth of information on labor market conditions in villages, cities, and urban areas. As a result, internet use could help rural households search for off-farm jobs. Thus, we use the information on household heads' off-farm employment to assess the influence of internet use and the probability of off-farm work. Thirdly, in contrast to the homogeneous information that social interaction in rural communities conveys, the internet delivers information from other sources and other places in the county or provinces. Not only the heterogeneous information helps induce innovation and entrepreneurship (Bhawe and Zahra, 2019), but also the emergence of novel and powerful digital technologies has transformed innovation and entrepreneurship in significant ways (Nambisan et al., 2019). In this case, rural households may get information or ideas on starting their own business or may be more likely to use the internet to start a business.

To simplify the problem, we focus on the difference between internet users and non-internet users. The results in Table 8 indicate that the internet use of household heads has a

significant and positive effect on gift expenditures, off-farm employment, and engaging in self-employed businesses. These results suggest that compared to rural households that do not use the internet, rural households using the internet spend more on gifts for social relations (by 16.3%) and are more likely to engage in off-farm employment (by 23.9%). Furthermore, rural households with access to the internet are 49.5% more likely than rural households who do not use the internet to participate in business entrepreneurship. These align with results of previous literature by Ma et al. (2020a) ,Ma et al. (2020b),and Ma et al. (2020c).

6. Conclusion and Policy Implications

We apply data from the China Family Panel Studies (CFPS) in 2018 to explore the influence of internet use on rural households' leasing out of farmland based on a binary logit model with village fixed effects. The findings of baseline models show that use of the internet and time spent on the internet have a significant and positive impact on rural households' decision to lease out farmland. Using the internet via mobile phone has a more substantial effect on leasing out farmland than using it via computers. An increase in the frequency of internet use for work, social communication, entertainment, and business results in a higher likelihood of leasing out farmland. Rural households with female or older household heads are more likely to lease out farmland than households with male or younger household heads. In contrast, rural households with large family sizes and families with healthier members are less likely to lease out farmland than rural households with smaller families and then those with less healthy family members. Rural households with higher incomes (per capita net income and wages as a share of income) are more likely to lease out farmland than those with lower incomes.

The results of the heterogeneity analysis indicate that internet use differs by the educational attainment of the rural household head, by the age of the household head, and by household income. Internet use makes a significant difference in rural households with a head of primary school education or below. The frequency of internet use for social communication significantly and positively affects leasing-out decisions for older household heads (age 53-63). In contrast, internet use for employment and business activities positively impacts decisions to lease out farmland for middle-aged (age 44-52) and younger (age 18-43) heads of rural households. We also found that internet use is more likely than for rural households with per capital net income below 6,500 yuan, to promote the probability of leasing out farmland for rural households with higher per capita net income (over 6,500 yuan). Further analysis shows that internet use significantly promotes rural households' social networks, increases their likelihood of engaging in non-farm employment, and increase their likelihood of participating in business activities, which finally contribute to their leasing out of farmland.

Based on these findings, governments should take some actions to promote farmland transfer and increase farms' scale. The first is to provide appropriate training in internet use according to the needs of rural families. This can improve rural households' ability to search for and collect information and foster their ability to learn autonomously. Second, the government should improve the information infrastructure in rural areas and support computer and smartphone use in rural areas. Finally, the government can build an information platform to provide real, practical information on off-farm employment and information on entrepreneurship policies, which can help promote the flow of the labor force

and household income in rural areas.

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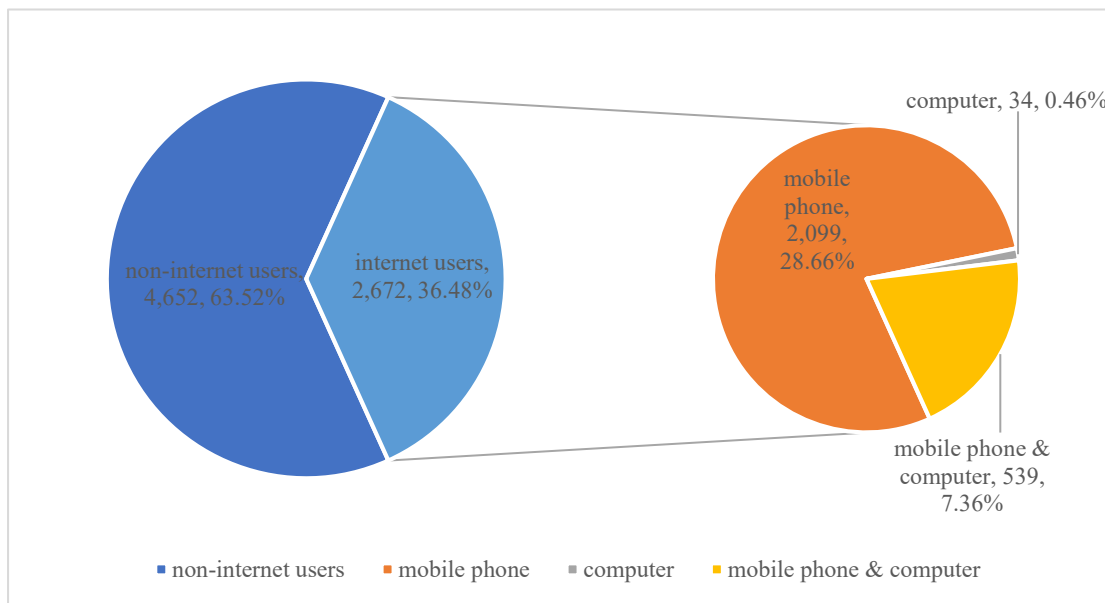
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Figure 1. Characteristics of rural households' internet use of CFPS 2018



Source: Peking University Open Research Data, China Family Panel Studies (CFPS) ,
<https://opendata.pku.edu.cn/dataset.xhtml?persistentId=doi:10.18170/DVN/45LCSO>.

Table 1. Frequency of internet use for various purposes

Frequency of use	Study	Work	Social communication	Entertainment	Business
Never	6,109	6,609	4,957	5,068	5,918
About once in several months	82	31	25	30	258
Once a month	261	42	45	85	226
2-3 times a month	136	57	108	139	363
Once or twice a week	255	116	351	448	257
3-4 times a week	160	88	436	421	151
Almost every day	321	381	1,402	1,133	151
Total	7,324	7,324	7,324	7,324	7,324

Source: Peking University Open Research Data, China Family Panel Studies (CFPS) ,
<https://opendata.pku.edu.cn/dataset.xhtml?persistentId=doi:10.18170/DVN/45LCSO>.

Table 2. Definition and summary statistics of variables

Variable	Description	Mean	Std. Dev
Dependent variables			
leaseout	=1 if rural household leased out farmland; 0 otherwise	0.189	0.392
Internet use			
Ifinternet	=1 if household head (HH) used internet; 0 otherwise	0.365	0.481
Internet_mode1	=1 if HH used internet via cellphone; 0 otherwise	0.287	0.452
Internet_mode2	=1 if HH used internet via computer; 0 otherwise	0.005	0.068
Internet_mode3	=1 if HH used internet via cellphone and computer; 0 otherwise	0.074	0.261
Internet_time	Time spent on internet by the HH (hours/week)	4.003	8.470
Freq_study	Frequency of internet use for study: 1-7 ^a	1.650	1.606
Freq_work	Frequency of internet use for work: 1-7	1.475	1.516
Freq_social	Frequency of internet use for social communication: 1-7	2.698	2.535
Freq_entertainment	Frequency of internet use for entertainment: 1-7	2.545	2.413
Freq_business	Frequency of internet use for business: 1-7	1.613	1.431
Household characteristics			
Age	Age of household head (years)	52.309	13.831
Gender	=1 if HH is male; 0 otherwise	0.562	0.496
Education	Education of HH: 1=primary school or below, 2=junior high school, 3=senior high school, 4= above high school	1.585	0.785
Marriage	=1 if HH is married; 0 otherwise	0.838	0.369
Familysize	Number of family members	3.940	1.987
Share_young	Share of family members 14 and under	0.042	0.100
Share_elder	Share of family members 65 and above	0.185	0.305
Health	Average health status of a family member: 1=unhealthy, 2=little healthy, 3=medium, 4=relatively healthy, 5=very healthy	2.460	1.019
Durables	Market value of household durable goods (CNY Yuan)	31171.41	85699.26
Income	Per capita net household income (CNY Yuan)	17967.44	45590.10
Share_wage	Share of wage income to total household income (%)	59.274	42.087
Observation		7,324	

Source: 2018 wave of the China Family Panel Studies (CFPS), Peking University Open Research Data.

Note: ^a 1=never, 2=one time sever month, 3= once a month, 4=2-3 times a month, 5=once or twice a week, 6=3-4 times a week, 7=almost every day.

Table 3. Results of influence of internet use on leasing out farmland

<i>Dependent variable: =1 if rural household leased out farmland; 0 otherwise</i>						
	(1)		(2)		(3)	
	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
Ifinternet	0.337*** (0.113)	1.401				
Internet_mode1			0.324*** (0.114)	1.382		
Internet_mode2			-0.665 (0.712)	0.514		
Internet_mode3			0.541*** (0.203)	1.718		
Internet_time					0.014*** (0.005)	1.014
Age	0.011** (0.005)	1.011	0.012** (0.005)	1.012	0.009** (0.004)	1.009
Gender	-0.179** (0.082)	0.836	-0.184** (0.082)	0.832	-0.174** (0.082)	0.840
Education	0.029 (0.055)	1.029	0.017 (0.058)	1.017	0.042 (0.056)	1.043
Marriage	-0.492*** (0.119)	0.612	-0.483*** (0.119)	0.617	-0.473*** (0.118)	0.623
Familysize	-0.072*** (0.026)	0.931	-0.073*** (0.026)	0.930	-0.074*** (0.026)	0.929
Share_young	-0.378 (0.459)	0.685	-0.362 (0.457)	0.697	-0.371 (0.461)	0.690
Share_elder	0.803*** (0.155)	2.233	0.794*** (0.156)	2.213	0.799*** (0.154)	2.223
Health	-0.180*** (0.043)	0.835	-0.181*** (0.043)	0.834	-0.179*** (0.043)	0.836
Durables(ln)	0.014 (0.015)	1.014	0.013 (0.015)	1.013	0.015 (0.015)	1.015
Income (ln)	0.173*** (0.052)	1.189	0.171*** (0.052)	1.187	0.175*** (0.052)	1.191
Share_wage	0.003*** (0.001)	1.003	0.003*** (0.001)	1.003	0.003*** (0.001)	1.003
Constant	- 17.559*** (1.167)		- 17.546*** (1.168)		- 17.407*** (1.162)	
Village dummy	Yes		Yes		Yes	
Observations	7,324		7,324		7,324	
Pseudo R ²	0.187		0.188		0.187	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets. Model (1): Internet_mode 1=1 if HH used internet via cellphone, 0 otherwise; Model (2) Internet_mode 2=1 if HH used internet via computer, 0 otherwise; Model (3) Internet_mode 3=1 if HH used internet via cellphone and computer, 0 otherwise.

Table 4. Results of impacts of Internet use frequency on leasing out farmland grouped by purposes of internet use

Dependent variable: =1 if rural household leased out farmland; 0 otherwise

	(1)		(2)		(3)		(4)		(5)	
	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
Freq_study	0.011 (0.027)	1.011								
Freq_work			0.058* (0.031)	1.059						
Freq_social					0.081*** (0.020)	1.085				
Freq_entertainment							0.081*** (0.021)	1.085		
Freq_business									0.127*** (0.031)	1.136
Age	0.005 (0.004)	1.005	0.007 (0.004)	1.007	0.013*** (0.005)	1.013	0.013*** (0.004)	1.013	0.011** (0.004)	1.011
Gender	-0.174** (0.082)	0.840	-0.186** (0.081)	0.830	-0.175** (0.082)	0.840	-0.183** (0.082)	0.833	-0.183** (0.081)	0.833
Education	0.055 (0.057)	1.056	0.034 (0.056)	1.034	0.022 (0.055)	1.022	0.019 (0.057)	1.019	0.016 (0.056)	1.016
Marriage	-0.483*** (0.118)	0.617	-0.480*** (0.118)	0.619	-0.484*** (0.119)	0.616	-0.484*** (0.119)	0.616	-0.470*** (0.119)	0.625
Familysize	-0.072*** (0.026)	0.930	-0.073*** (0.026)	0.930	-0.072*** (0.026)	0.930	-0.071*** (0.026)	0.932	-0.076*** (0.026)	0.926
Share_young	-0.347	0.707	-0.344	0.709	-0.412	0.663	-0.404	0.668	-0.431	0.650

	(0.459)		(0.459)		(0.460)		(0.458)		(0.467)	
Share_elder	0.832***	2.299	0.816***	2.261	0.778***	2.178	0.781***	2.184	0.752***	2.121
	(0.153)		(0.153)		(0.154)		(0.155)		(0.156)	
Health	-0.181***	0.834	-0.182***	0.833	-0.182***	0.833	-0.180***	0.835	-0.177***	0.838
	(0.042)		(0.042)		(0.043)		(0.042)		(0.042)	
Durables(ln)	0.017	1.017	0.016	1.016	0.013	1.013	0.013	1.013	0.015	1.015
	(0.015)		(0.015)		(0.015)		(0.015)		(0.015)	
Income (ln)	0.187***	1.206	0.183***	1.201	0.169***	1.184	0.166***	1.181	0.170***	1.186
	(0.052)		(0.052)		(0.052)		(0.052)		(0.052)	
Share_wage	0.003***	1.003	0.003***	1.003	0.003***	1.003	0.003***	1.003	0.003***	1.003
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Constant	-		-17.641***		-		-		-	
	17.577***				17.712***		17.643***		17.701***	
	(1.166)		(1.163)		(1.169)		(1.166)		(1.164)	
Village dummy	Yes		Yes		Yes		Yes		Yes	
Observations	7,324		7,324		7,324		7,324		7,324	
Pseudo R ²	0.185		0.186		0.188		0.188		0.188	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets.

Table 5. Estimates of internet use on leasing out farmland, by educational group, China 2018

<i>Dependent variable: =1 if rural household leased out farmland; 0 otherwise</i>							
		(1)		(2)		(3)	
		Primary school or below		Junior high school		Senior high school or above	
		Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
M1	Ifinternet	0.261 (0.161)	1.298	0.157 (0.265)	1.170	0.100 (0.504)	1.105
M2	Internet_model1	0.221 (0.165)	1.248	0.158 (0.270)	1.172	0.340 (0.514)	1.406
	Internet_model2	-0.819 (1.665)	0.441	-1.971 (1.286)	0.139	-2.255 (1.852)	0.105
	Internet_model3	0.966** (0.464)	2.627	0.409 (0.383)	1.505	-0.429 (0.713)	0.651
M3	Internet_time	0.016** (0.008)	1.016	0.002 (0.009)	1.000	0.029 (0.023)	1.030
M4	Freq_study	-0.044 (0.070)	0.957	0.045 (0.051)	1.046	-0.076 (0.096)	0.927
M5	Freq_work	-0.022 (0.091)	0.978	0.088 (0.056)	1.092	-0.029 (0.090)	0.972
M6	Freq_social	0.050 (0.031)	1.051	0.070 (0.049)	1.072	0.093 (0.083)	1.097
M7	Freq_entertainment	0.102*** (0.032)	1.108	0.023 (0.044)	1.025	0.049 (0.090)	1.050
M8	Freq_business	0.236*** (0.069)	1.266	0.045 (0.063)	1.049	-0.023 (0.116)	0.977
Control variables		Yes		Yes		Yes	
Village dummy		Yes		Yes		Yes	
Observations		4,196		2,185		943	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets. M1-M8 are independent models of different subsamples. The control variables and village dummies of all these models are the same as in Table 3.

Table 6: Estimates of internet use on leasing out farmland, by the age of household head group, China 2018

Dependent variable: =1 if rural household leased out farmland; 0 otherwise

		(1)		(2)		(3)		(4)	
		Age 18-43		Age 44-52		Age 53-63		Age over 63	
		Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
M1	Ifinternet	0.178 (0.344)	1.195	0.355 (0.247)	1.426	0.368 (0.252)	1.445	-0.073 (0.534)	0.929
M2	Internet_model1	0.246 (0.345)	1.279	0.308 (0.247)	1.361	0.387 (0.259)	1.472	0.167 (0.496)	1.182
	Internet_model2	-1.036 (1.156)	0.355	. (.)	1.000	-0.936 (1.062)	0.392	-0.012 (2.514)	0.988
	Internet_model3	-0.027 (0.490)	0.974	0.777 (0.483)	2.175	0.540 (0.772)	1.716	. (.)	1.000
M3	Internet_time	0.010 (0.009)	1.010	0.016 (0.015)	1.016	0.033 (0.023)	1.033	-0.006 (0.042)	0.994
M4	Freq_study	0.078 (0.066)	1.081	0.033 (0.075)	1.034	-0.065 (0.088)	1.067	-0.498* (0.264)	0.608
M5	Freq_work	0.077 (0.071)	1.080	0.032 (0.085)	1.033	0.093 (0.097)	1.098	-0.416 (0.284)	0.659
M6	Freq_social	0.087 (0.055)	1.091	0.024 (0.048)	1.025	0.115** (0.047)	1.122	0.064 (0.106)	1.066
M7	Freq_entertainment	0.049 (0.058)	1.050	0.108** (0.049)	1.114	0.064 (0.050)	1.067	0.041 (0.130)	1.045
M8	Freq_business	0.127* (0.073)	1.136	0.100 (0.084)	1.105	-0.004 (0.129)	0.996	0.424 (0.707)	1.432
Control variables		Yes		Yes		Yes		Yes	
Village dummy		Yes		Yes		Yes		Yes	
Observations		1,824		1,867		1,904		1,729	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets. M1-M8 are independent models of different subsamples. The control variables and village dummies of all these models are the same as in Table 3.

Table 7. Estimates of internet use on leasing out farmland, by income group, China 2018.

Dependent variable: =1 if rural household leased out farmland; 0 otherwise

	(1) Low income below 6500		(2) Middle income (6500,11890]		(3) High-middle income (11890,20440]		(4) High-income (20440,330000]	
	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
M1 Ifinternet	0.163 (0.358)	1.177	0.350 (0.308)	1.420	0.465* (0.241)	1.592	0.511** (0.224)	1.668
M2 Internet_model1	0.176 (0.353)	1.192	0.199 (0.319)	1.220	0.529** (0.244)	1.697	0.176 (0.353)	1.741
Internet_model2	.	1.000	1.627 (1.714)	5.091	.	1.000	.	0.912
Internet_model3	0.171 (1.066)	1.187	1.555*** (0.595)	4.736	0.602 (0.455)	1.826	0.171 (1.066)	1.383
M3 Internet_time	0.030 (0.021)	1.031	-0.002 (0.017)	0.998	0.016 (0.014)	1.016	0.015 (0.010)	1.015
M4 Freq_study	-0.065 (0.114)	0.937	-0.075 (0.094)	0.927	0.082 (0.071)	1.086	-0.022 (0.055)	0.978
M5 Freq_work	-0.069 (0.165)	0.933	0.170** (0.085)	1.185	0.057 (0.077)	1.059	0.011 (0.059)	1.013
M6 Freq_social	0.087 (0.055)	1.016	0.110* (0.060)	1.116	0.106** (0.048)	1.112	0.119*** (0.042)	1.126
M7 Freq_entertainment	-0.005 (0.073)	0.995	0.115* (0.060)	1.121	0.134*** (0.049)	1.143	0.090** (0.043)	1.094
M8 Freq_business	0.117 (0.165)	1.124	0.173 (0.120)	1.189	0.197*** (0.076)	1.218	0.065 (0.066)	1.067
Control variables	Yes		Yes		Yes		Yes	
Village dummy	Yes		Yes		Yes		Yes	
Observations	1,837		1,825		1,831		1,831	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets. M1-M8 are independent models of different subsamples. The control variables and village dummies of all these models are the same as in Table 3.

Table 8. Results of the mechanism of internet use affecting leasing out farmland, China 2018

	(1) OLS Ln (Gift expenditures)	(2) Logit Off-farm Employment	(3) Logit Self-employed Business
Ifinternet	0.163** (0.068)	0.239** (0.104)	0.495*** (0.140)
Age	-0.004 (0.003)	-0.066*** (0.005)	-0.007 (0.006)
Gender	-0.047 (0.062)	0.983*** (0.100)	-0.060 (0.120)
Education	0.025 (0.039)	0.336*** (0.063)	0.164** (0.077)
Marriage	0.580*** (0.104)	0.393** (0.165)	0.062 (0.202)
Familysize	0.141*** (0.020)	-0.125*** (0.029)	0.299*** (0.037)
Share_young	-0.237 (0.312)	0.081 (0.428)	0.441 (0.580)
Share_elder	-1.013*** (0.146)	0.536** (0.225)	-0.984*** (0.315)
Health	0.025 (0.033)	-0.044 (0.042)	0.071 (0.066)
Durables(ln)	0.112*** (0.014)	-0.036** (0.017)	0.122*** (0.035)
Income (ln)	0.418*** (0.044)	0.342*** (0.071)	0.805*** (0.094)
Share_wage	0.000 (0.001)	0.027*** (0.002)	-0.024*** (0.002)
Constant	1.685*** (0.478)	-2.950*** (0.793)	-12.014*** (1.005)
Village dummy	Yes	Yes	Yes
Observations	7,324	7,324	7,324
R^2 /Pseudo R^2	0.384	0.330	0.259

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors adjusted for clustering at the village-cluster level in brackets. Dependent variables: Ln(Gift expenditures), Off-farm Employment, Self-employed Business.

Appendix

Table A1. Sample design of 25 provinces in CFPS

Type	Provinces (municipalities/ autonomous regions)	Target number of households
Large province	Shanghai, Liaoning, Henan, Gansu, Guangdong,	1,600 every province
Small province	Jiangsu, Zhejiang, Fujian, Jiangxi, Anhui, Shandong, Hebei, Shanxi, Jilin, Heilongjiang, Guangxi, Hubei, Hunan, Sichuan, Guizhou, Yunnan, Tianjin, Beijing, Chongqing, Shaanxi	8,000

Source: 2018 wave of the China Family Panel Studies (CFPS), Peking University Open Research Data.

Table A2. Difference between internet use and household characteristics

	Whether use internet				Internet mode						Time spent on internet by the HH (hour/week)					
	internet user		non-internet user		cellphone		computer		both		0	(0,12]		above12		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	42.493	11.211	57.947	11.910	43.861	10.872	39.824	14.339	37.332	10.768	57.897	11.942	44.106	10.766	39.803	11.408
Gender	0.555	0.497	0.566	0.496	0.528	0.499	0.588	0.500	0.660	0.474	0.567	0.496	0.552	0.497	0.556	0.497
Education	1.938	0.888	1.382	0.636	1.751	0.764	2.588	1.019	2.627	0.966	1.384	0.638	1.845	0.865	2.093	0.904
Marriage	0.883	0.322	0.812	0.391	0.901	0.298	0.794	0.410	0.816	0.388	0.812	0.391	0.895	0.307	0.864	0.343
Familysize	4.179	1.899	3.804	2.023	4.221	1.861	3.118	1.533	4.080	2.038	3.801	2.022	4.156	1.865	4.233	1.952
Share_young	0.051	0.108	0.037	0.094	0.053	0.109	0.066	0.192	0.042	0.096	0.036	0.094	0.051	0.110	0.050	0.106
Share_elder	0.079	0.161	0.245	0.348	0.084	0.166	0.104	0.253	0.057	0.131	0.245	0.347	0.085	0.170	0.069	0.146
Health	2.538	0.993	2.416	1.031	2.523	0.982	2.824	1.114	2.579	1.025	2.416	1.031	2.546	0.989	2.526	0.999
Durables(ln)	9.213	2.549	7.754	3.084	8.993	2.533	8.959	3.220	10.088	2.370	7.755	3.086	9.036	2.570	9.528	2.458
Income (ln)	9.638	0.898	9.145	0.992	9.530	0.865	10.068	0.854	10.034	0.912	9.147	0.993	9.554	0.891	9.781	0.892
Share_wage	68.985	37.718	53.697	43.435	67.219	38.328	67.307	40.467	75.969	34.243	53.734	43.430	68.141	38.262	70.459	36.718

Source: 2018 wave of the China Family Panel Studies (CFPS), Peking University Open Research Data.