Landline and Migrant Workers: Evidence from China*

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Abstract

With the political and trade liberalization in the past decades, many Asian and Pacific countries have experienced large and sustained worker migration. Owing to the huge surplus of rural labor and regional income gap, millions of workers migrated from less developed to more developed regions in hope for a better living. In this context, the easy access to communication technology is crucial to migration decision with respect to economic and psychological costs of migration. This paper explores the effects of the introduction of landline telephone on the ratio of migrant workers. Using a seven-year panel data set covering 58 sample villages across six provinces in China between 1993 and 2000, we find that the new introduction of landline substantially influence the ratio of migrant workers in China, increasing the likelihood of migration by at least one household member by 2 percentage points. Evidences suggest that landline telephone affects out-migration through the provision of outsider job opportunities information and timely communication with the left-behind family members, which lower the economic and psychological costs of migration.

Keywords: Migrant workers; Landline telephone; Difference in difference

1 Introduction

Asia-Pacific region homes almost 60 percent of the world’s population, the internal or international migration for employment in this region is not a recent phenomenon. In the past decades many Asian and Pacific countries have experienced economic miracles, but the rapid economic growth is uneven across regions and countries. Owing to the wide disparities in labor demand and in wage rate, tens of millions of workers migrated from the less developed to the more developed regions. According to the census from the International Labor Organization, around 25 million Asian workers are currently employed outside their home countries. These unskilled and semi-skilled employees have temporarily left their farmlands and performed all kinds of service and maintenance jobs. For example, a large number of Filipinos and Indonesians work as domestic helpers in Hong Kong and Singapore, or as construction workers in the Republic of Korea.

It is evident that both migrants sending and hosting regions have benefited a lot from migration. For sending areas, migration and remittances reduce poverty, especially for poor countries and areas

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(Adams and Page 2005). Through the large flow of remittances sent back, migrant workers have greatly contributed to the local development, increased the living standard of their family members who had stayed behind. It has been shown that a 10 percent increases in the share of remittances in a country’s GDP will reduce the share of residents living on less than $1 a day by 1.6 percent. For instance, Filipino migrants remitted a total of $14.4 billion in 2007, which is equivalent to 10 percent of the country’s GDP. There is no doubt that the large amount of remittances is associated with a great reduction in poverty among Philippines. Furthermore, migrant workers have expanded their horizons and increased their human capital through their working experiences in developed regions. When they returned to their home villages, those migrant workers can play a significant role in the local socio-economic development of sending areas. Because of the importance of migrant workers, labor migration has been regarded as one of important strategies to promote economic growth and to reduce rural poverty by many countries, such as China, Philippine and Thai.

Labor migration benefits not only the labor sending areas, but also the labor host regions. Evidently, migrant workers bring their labor, skills and provide valuable services to the economies. They usually do 3-D (dirty, dangerous and difficult or demanding) jobs which the local people do not want to do; their low wages and hardworking make the economies that receive them more competitive and, hence, make positive contributions to the host areas. Moreover, migrant workers have raised human capital formation and changed the cultural composition of the population in receiving areas. Increases in the cultural fractionalization would increase output per capita due to greater variety of workers’ skills and a greater variety of goods and services (Ager and Bruckner 2011).

However, with more and young skilled workers migrate from rural and less developed to urban and more developed regions, the sending areas suffer the brain drain problem. In western China, for example, most young adults have left their villages in droves to seek non-agricultural jobs in cities, their young children stay with grandparents, great-grandparents or any other relatives who can shelter and feed them. Researchers estimate that at least 58 million — nearly a quarter of the nation’s children and almost a third of its rural children — are growing up without one or both of their parents, who have migrated in search of work. More than half of those were left by both parents. As a result, many cultivated lands are wasted because it mostly the elderly who are working in agriculture. What’s even worse is that the left-behind children face stark psychological and emotional challenges. Being separated from their parents, many children struggle to keep up with their lessons and end up abandoning school in their teens to join their parents on the road. In the meantime, migration also brings risks to host cities. People argue that migrant workers pose a risk to the maintenance of socio-cultural homogeneity of the host country population, increase the crime rates in host regions, bring various diseases, and steal jobs from the local population. Moreover, migrant workers’ exploitative and abusive treatment often provokes criticism. So the cultural polarization and social destabilization are great challenges for governments of destination regions.

Why do people migrate is a complex issue and a fairly large literature has investigated the determinants of migration. It was widely accepted that the primary determinants of migration can be classified into two types, namely demand-pull and supply-push factor. In particular, labor recruitment and high payment in cities are two important forces pulling migration (Todaro 1969, Robinson and Tomes 1982, Hare 1999), while the main push factors include surplus labor and poverty resulting from crops failure or farmland
shortages (Hare 1999, Jalan and Ravallion 2000). There are economic disparities among regions of Asia. For instance, Japan, Singapore, Hongkong, the Republic of Korea, Taiwan, coastal areas in China had record growth since 1970s; there are more job opportunities with higher wages in those areas relative to less developed regions. So people migrate for better opportunities and higher incomes. Todaro (1969) indicates that people migrate when the present value of the expected benefits of higher wages in the destination area exceeds the costs, which include the costs of moving, perhaps unemployment in the destination, and the costs of separation from family. In addition to the economic reasons, people also move to flee from persecution and armed conflict, to search for adventure and exploration. Furthermore, migrants who are lured by friends and relatives would be more likely to move, since networks of friends and relatives already working in destinations serve as sources of information and anchor communities for newcomers (Massey et al. 1993, Munshi 2003 Mckenzie and Rapoport 2007).

The accessibility, timeliness and accuracy of the labor market information are known to be crucial in potential migrant workers’ decision. Which type of skills do recruiters prefer? How can they search for jobs in cities? How do they obtain permission from authorities in their home communities prior to their departure as well as get the residence and work permits in the destinations? What are the normal payments as a migrant worker in a particular industry sector? All these are key challenges facing potential migrant workers. Limited or inaccurate information tend to increase the cost of migration and lower the migrant propensity. However, the impact of access to information technology on migration has only been studied by several researchers. Braga (2007) and Farre (2011) investigate the impact of television introduction on migration decision but get very different results. Using data from Albanian Panel Living Standard Measurement Survey, Braga (2007) shows that individuals exposed to foreign media are more likely to migrate internationally since foreign media exposure increases their openness towards other cultures. While Farre (2011) investigates the impact of television on internal migration in Indonesia and shows that higher exposure to private TV broadcasting in one area has reduced the propensity to migrate of Indonesian citizens both in the short and in the long run. The author argues that better information makes individuals more able to accurately predict the benefits and costs associated with migration and thus leads to more accurate migration choices. Both Megumi (2009) and Aker et al. (2011) have investigated the relationship between access to mobile phones and migration, in Niger and Uganda, respectively. Megumi (2009) examines the combined impact of mobile phone coverage expansion and personal networks, and shows that the mobile phone network expansion increases the chance of choosing migration to find a job since mobile phone coverage strengthens the existing majority ethnic network. Aker et al. (2011) finds that access to mobile phone technology in Niger increases both the probability and intensity of rural-urban migration by increasing information about the labor market at destination.

Nonetheless, no studies have examined how the access to land-line telephones affects migration intensity. The focus of our paper is on the effect of land-line telephone installation on internal migration in China. Since the economic reforms in 1978, China has experienced an era of substantial and sustained rural-urban migration. Owing to the huge surplus of rural labor and regional income gap, millions of workers migrated from western and central regions of China to the coastal regions in hope for a better living (Massey et al. 1987). Unfortunately, long cross-region distance burdens the cost of job hunting and migration, especially for peasants living in rural places, where modern information technologies (like
phones and Internet) are still poorly applied just a few decades back from now. As a result, the village of origin is a key site for potential migrants, who relied heavily on the annual or semi-annual home-returns of current migrants to obtain information about outside labor demand. However, this kind of information acqirement process not only is imprecise itself, but also leads to very costly delays.

In this context, the installation of landline telephones in the village of origins provided a new technology for collecting labor market information, which can have important implications for households’ migration behavior. Since 1990s, installation of land-line telephones was phased-in throughout the central and western rural areas in China. As potential migrants have traditionally waited for the temporary return of existing migrants or travelled to big cities to find out the job opportunities and wage information, landline telephone should have reduced the search costs, allowing them to search over a large number of markets more quickly and precisely. Apart from the reduction in economic costs, this cheaper and faster communication tool has enabled the migrants to be in frequent contact with their families, and thus has markedly decreased the emotional costs of migration. These effects can be particularly dramatic in rural China during 1990s. At that time, the internal rural to urban migration surged and landline telephone served as the only modern telecommunication tools connecting the migrant laborers and their families and relatives left behind.

This paper exploits the exogenous variation of landline telephone roll out in rural China to identify its impact on the rate of rural-urban migration in China. We focus in our empirical analysis on the period 1993 to 2000, rather than on the whole post 1978 period for two main reasons. First, Chinese government carried out a series of stimulus packages, such as massive capital investment and tax reduction, to speed up the construction of telecom infrastructure. As a result, China’s telecoms industry started to takeoff in 1990s. Telecommunication companies expanded their markets and provided telephone services to some well-developed villages. Then at the beginning of the 21st century, with the development of landless telecommunication technology, the number of cellular phones in China has grown enormously, so land-line telephone was not the only modern telecommunication tools for villagers. Second, we take 2000 as the terminal point because at the turning of the 21st century, there was a significant change in China’s migration policy. In the period 2000-2004, the Chinese government made a serious effort to free the labor market across and guarantee more equitable opportunities for migrant laborers, like reforming the household registration system (hukou), eliminating the restrictions on the flow of rural laborers, establishing a social security system, ensuring fair treatment of migrant workers and improving basic education services for the children of migrants in cities. In order to identify the impacts of landline telephones on migration, we want to leave out other policy changes that could have affected both the migration and telecom infrastructure.

The primary analysis relies on a seven-year panel data set covering 58 sample villages across six provinces in China between 1993 and 2000. These years represent a time of rapid growth in rural landline telephone access. During the panel, land-line telephones were newly introduced in 21 of the 58 villages. Over the same period, the rate of migrant workers who work outside their home counties over the village population raised from 2.2% to 4.6%. By comparing changes in migration rate across villages based on whether and when they newly added land-line telephones, we find evidence that newly access to land-line telephones has large positive effects on migration rates.

In the following section, we provide background on rural-urban migration and the development of
land-line telephones in China, briefly discuss the relationship between these two factors as well. Section 3 describes the data and empirical strategy. Section 4 reports some descriptive evidence. Section 5 and 6 presents estimation results and robustness checks. Section 7 concludes the paper.

2 Background and Data

2.1 Migration in China

Because of the food shortage and the devastating famine after the collapse of the Great Leap Forward in the beginning of 1960s, the Chinese government started to intensify the household registration system (hukou), as argued in Wu (1994) and Zhao (2000). Hukou governs where one can live and the public benefits to which one is entitled. In the meantime, under the People’s Commune System, each farmer was a member of a collective production-team and earned food based on his or her daily participation in the collective farming. Through these two systems, government tied the farmers to the land and strictly controlled the rural to urban migration. From 1949 to 1985, the average rural to urban migration rate for China was only 0.24, compared with a world average of 1.84 from 1950 to 1990, see Zhao (2000).

It was since 1978 that China embarked on a great economic and social transformation. In rural China, the Household Responsibility System emerged and eventually replaced the People’s Commune System, which greatly improved agricultural efficiency and generated surplus labor (Lin 1992). In the urban areas, the development of market-oriented economy and special economic zones, the expansion of the non-state sector and the loosening of the urban employment policy created the demand for migrants (Meng and Zhang 2001; Cai 2001). In addition, decades of urban-urban segregation and uneven economic growth led to a large income gap between urban and rural areas, which provided a stimulus for people to migrate to coastal and eastern China (Bao and Bodvarsson 2009). All these developments have contributed to China’s surge in internal rural to urban migration since 1978.

National Bureau of Statistics of China defines rural labor migrants as individuals who have rural household registration status but left their homeland and have worked outside the towns and counties for at least six months. According to this definition, the number of rural labor migrants rose to around 60 million in 1994, 88 million in 2000 and nearly 253 million in 2011. As many migrants have relatively lower education and fewer skills, manufacturing sector and construction sector have absorbed more than half of those migrants, employing 36% and 17.7% of all migrant laborers in 2011, respectively. (Source: National Bureau of Statistics of China) Through their hard work, high savings, and low consumption and by reducing the pressure on the land, these rural laborers have contributed a lot to both receiving areas and sending areas. With the advantage of large numbers of cheap laborers, the Zhujiang Delta and Yangtze River Delta have become one of the most important global manufacturing bases in 1990s (Huang and Zhan 2005). Migrants generally earn higher incomes than they would if they had stayed in the villages, the large amount of remittances had greatly contributed to the local development of sending areas through consumption and investment, thus reduced rural poverty since the late 1990s (Brauw and Rozelle 2004).

Unlike many other international or internal migrations in the world, the rural-urban migration in China has its own features. Due to the presence of Household Registration System in China, it is extremely difficult for migrants to permanently settle down in hosting cities. Moreover, Chinese peasants
are reluctant to give up farmland; many migrants tend to temporary go back to their native places and then migrate circularly. An average migrant is reported to return home two to three times annually and to spend less than 9 months in hosting cities (Zhao 1999). This pattern creates the Spring Festival travel season and increases the role of the village of origin, making it serve as an intermediary for job searching. So the village-based migrant network is another feature of rural to urban migration in China. As for rural laborers, they have limited ties with the urban communities and little access to institutional supports at the destinations, so they have to rely on their origin-based networks to find jobs (Solinger 1999; Zhao 2003; Chen 2009). It has been shown in Meng (2000) that 70 per cent of rural-urban migrants in China found jobs through the network of village-based friends or relatives since the presence of friends and relatives already at the destination tends to lower the psychic and information costs generated by migration. With the installation of land-line telephones in villages, potential migrants do not have to wait for the temporary return of previous migrants to obtain labor market information of employment and wage opportunities, which obviously reduce costly delays and further lower the search costs.

2.2 The Development of Landline Telephones in China

In 1880s, telephone services were available in major cities of the Qing Dynasty, such as Beijing, Tianjin, Shanghai and Nanjing. Long-distance cables and telecommunication network were further developed in Republican government time. However, many of the facilities and networks were destroyed during the following war years. When the People’s Republic of China was established in 1949, the country had only a number of 300,000 telephones in total, which means only 0.05 sets per 100 people. In addition, those remained telecommunication facilities were largely outdated and concentrated in some eastern coastal cities, and a few interior cities, such as Chongqing and Wuhan (Markus Wauschkuhn 2001).

Since its founding in 1949 up to its economic opening in the 1980s, the Chinese government gave priority to developing heavy industry which represented a force for production, thus neglected the telecommunication investment. The number of telephones grew very slowly and stagnated relative to the growth in population, reached only 0.38 sets per 100 people in 1978. In the late 1980s, with the policy of economic opening, the rapid growth in the economy clearly required better communications services, so the Chinese government began to increase investment in this sector. As the economic reforms deepened, the State Council of China approved the seventh five year plan in 1985, which stated that telecommunications became a national priority and suggested to focus the activity on major cities and the coastal areas. In the meanwhile, the government allowed the telecommunications industry to receive state loans with extended payment time and to borrow foreign currency, also gave the industry a preferential taxation. As a result, the number of telephone lines grew at an annual average rate of 17% between 1986 and 1990 (Clegg, Kamall and Leung 1996). However, the incentive schemes and federal support systems failed to improve the telecommunication industry satisfactorily, they gave a preferential treatment to some specific areas, especially in the open coastal cities and special economic zones, therefore, strengthened unevenly proceeding against the rural areas. By 1991, these areas accounted for nearly a quarter of the telecommunications network in China (Irene Wu 2008). Almost all subscribers were living in urban areas while people in remote rural parts of China remained unconnected.

For most of the time of the People’s Republic of China, the Ministry of Posts and Telecommunications (MPT) was the main operator and regulator of telecommunication services, this monopoly structure
had seriously constrained the further growth and development of telecommunication industry, especially after the economic reform. In late 1990s, China’s Government started the telecommunication deregulation and liberalization. By giving more administrative autonomy to Post and Telecommunications Bureaus on regional and local level, introducing more competitors to reconstruct the market, opening the telecommunication market to foreign investors step by step, China’s telecommunications industry has been transforming from a monopoly to competition. As a result, the service quality has been largely improved and charges have dropped down greatly, which lead to record growth in telephone inhabitants. As showed in Figure 1, the land-line number of sets per 100 people increased from less than 1 in 1990 to more than 12 in 2000, and reached the peak of 28.1 by 2006. With the development of the wireless technology, the number of cellular phones has grown enormously, surpassing that for land-line telephones in 2003, peaking at 75 sets per 100 people by 2011. But between 1993 and 2000, it is clear that land-line telephone is at its most influential as the primary modern telecommunication tools connecting the outside world for Chinese people, especially in western and central rural areas, suggesting this may be an ideal period to look for effects.

Figure 1. Phones per 100 people in China, from 1978-2011. Source: National Bureau of Statistics (2012)

2.3 Data

The data come from the Rural Permanent Observation Sites Survey 1993, 1995-2000, conducted by the Ministry of Agriculture, China. Initially, we have a total of 67 villages in 1993. 6 villages are deleted as we cannot identify their location codes. Among the remaining 61 villages, 37 had landline telephone in 1993 (used as the control group), 21 installed landline telephone during the sample period (used as the treatment group), and 3 still had no landline telephone installed at the end of our sample period (used in a placebo test). The 58 villages used in the main analysis are located in 6 provinces, Liaoning,
Shandong, Hubei, Guangdong, Yunnan, and Gansu. See the Table 1 and Figure 2 for the distribution of these villages.

<table>
<thead>
<tr>
<th>Province</th>
<th>Code</th>
<th>No. of villages in 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liaoning</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>Shandong</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>Hubei</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td>Guangdong</td>
<td>44</td>
<td>10</td>
</tr>
<tr>
<td>Yunnan</td>
<td>53</td>
<td>5</td>
</tr>
<tr>
<td>Gansu</td>
<td>62</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>58</td>
</tr>
</tbody>
</table>

Table 1: No. of villages in each Province

![Figure 2. Distribution of villages](image)

3 Theoretical and Econometric Framework

3.1 Model

In this section, we provide a simple model to illustrate how landline telephone may affect the propensity of out-migration (see Borjas, AER, 1987). Consider the choice by individual $i$: whether to migrate to work outside or stay. If she chooses to migrate, her utility is given by

$$U^i_m = f^i (T, M) W^i_m - C^i_m - g^i (T, N) + \alpha^i_m,$$  \hspace{1cm} (1)
where $f_i(T, M)$ measures the labor market information available to individual $i$, which is determined by the access to communication technology (landline telephones) and individual’s information network measured by the number of migrant workers years ago in the same village. It is assumed that $f_T > 0$, $f_M > 0$ and $f_{TM} > 0$. $W_m^i$ is the wage individual $i$ can obtain if she migrates, and $C_m^i$ is the migration economic costs. $g^i(T, N)$ the psychological costs facing by migrant worker, such as leaving family members behind. It is assumed that $f_T > 0$, $f_M > 0$ and $f_{TM} > 0$.

$W_m^i$ is the wage individual $i$ can obtain if she migrates, and $C_m^i$ is the migration economic costs. $g^i(T, N)$ the psychological costs facing by migrant worker, such as leaving family members behind. It is assumed to decrease in the access to communication technology but increase in the number of left-behind children, i.e., $g_T < 0$, $g_N > 0$, $g_{TN} < 0$, $a_m^i$ is the random term. The utility of staying is assumed to be

$$U_i = W_m^i + a_s^i,$$

where $W_m^i$ is the local wage level and $a_s^i$ is the random term or unobservable characteristics.

Individual $i$’s choice depends on the sign of the index function

$$I(U_m^i - U_s^i) = I(\alpha^i f^i(T, M) (W_m^i - C_m^i) - \beta^i g^i(T, N) + a_m^i - W_s^i - a_s^i)$$

The probability of migrate is given by

$$P = \Pr[U_m > U_s]
= \Pr[f(T, M) W_m - C_m - g(T, N) + a_m > W_s + a_s]
= \Pr[a_s - a_m < f(T, M) W_m - C_m - g(T, N) - W_s]
= \int I(\bar{a}_m < f(T, M) W_m - C_m - g(T, N) - W_s) h(\bar{a}_m) \, d\bar{a}_m
= H(f(T, M) (W_m - C_m) - g(T, N) - W_s)$$

where $\bar{a}_m = a_s - a_m$ is the difference in random terms for alternative migrate and stay, $H(\cdot)$ and $h(\cdot)$ is the CDF and pdf of these differences, respectively.

Since $f_T > 0$, $f_M > 0$, and $f_{TM} > 0$, $g_{TN} < 0$, we have

**Proposition 1** $\frac{\partial P}{\partial T} > 0$

**Proposition 2** $\frac{\partial^2 P}{\partial T \partial M} > 0$

**Proposition 3** $\frac{\partial^2 P}{\partial T \partial N} < 0$

If $a_m, a_s \sim i.i.d$ type I extreme value distribution, the density for each unobserved component of utility is

$$h(a_j) = \exp(-a_j) \exp(-\exp(-a_j)) \text{ for } j = m, s$$

The cumulative distribution is

$$H(a_j) = \exp(-\exp(-a_j)) \text{ for } j = m, s$$
The difference between two extreme value variables is logistic. In other words, if \( a_m, a_s \sim i.i.d. \) extreme value, then \( \tilde{a}_{sm} = a_s - a_m \) has a logistic distribution, i.e.

\[
H(\tilde{a}_{sm}) = \frac{e^{\tilde{a}_{sm}}}{1 + e^{\tilde{a}_{sm}}} = \frac{1}{1 + e^{-\tilde{a}_{sm}}}
\]

which gives this expression for the migrate probability

\[
P = \frac{\exp(f(T, M)W_m - C_m - g(T, N))}{\exp(f(T, M)W_m - C_m - g(T, N)) + \exp(W_s)}
= \frac{1}{1 + \exp(-f(T, M)(W_m - C_m) + g(T, N) + W_s)}
\]

Now we have

\[
\ln\left(\frac{P}{1 - P}\right) = f(T, M)(W_m - C_m) - g(T, N) - W_s
\]

which gives us another regression specification.

### 3.2 Empirical Strategy

To identify the effect of landline telephone on out-migration, we use the difference-in-differences (DID) method. Specifically, we compare the ratio of out-migrant workers in the treatment group (villages that installed landline during the sample period) with that in the control group (villages that had landline at the beginning of the sample period) before and after the installation of the landline. Our empirical identification can be represented in the figure 3, which shows the difference in the ratio of out-migrant workers between the treatment and control groups at different time points. Clearly, before the installation of landline, there is no clear difference between the treatment and control groups, but these two display different trends right after the installation of the landline.

![Figure 3. Difference in the ratio of out-migrant workers](image)

Our baseline estimation equation is

\[
y_{vt} = \gamma_t + \theta_v + \beta T_{vt} + \varepsilon_{vt}
\]
where \( y_{vt} \) is the ratio of out-province-migration workers in village \( v \) at year \( t \); \( T_{vt} \) is the regressor of interest, equal to 1 if village \( v \) installed landline at year \( t \) and onwards; \( \gamma_t \) and \( \theta_v \) are time and village fixed effects; and \( \varepsilon_{vt} \) is the error term. To deal with the potential heteroskedasticity and serial correlation, we cluster the standard error at the village level.

### 3.3 Installation of Landline

One potential challenge to the above estimation specification is that the place and timing of the installation of landline are not random. Thus, it is important to understand what determines which village got landline earlier in order to isolate the effect of landline on out-migration.

We first conducted an intensive online research on how China Telecom Corp. decided which village to enter first during that period. The search engine we used is Baidu, the Chinese version of Google and the best in searching Chinese websites. Unfortunately, there is no much discussion about the determinants of landline installation online. Among the pieces of information we found, most of them cite income as the main reason. Without much information found online, we interviewed one China Telecom Corp. employee. Through the phone, she told us when considering which village to install landline first, the company considered mainly the degree of facility utilization, which is closely related to the village wealth.

We next provide a quantitative analysis on the determinants of landline installation based on these anecdotal evidence. We consider both the place and the timing of the landline installation. The first set of factors we consider are meant to capture the development degree of the village, i.e., total income and total population. The second set of factors concern about the political influence, i.e., whether the village was classified as the poverty village, and whether the village was classified as the remote village. The third set of variables look at the geographic features, which affect the costs of installing landlines, i.e., the percentage of arable land and whether the village was in the mountain areas. Lastly, we investigate whether the installation is triggered by the needs of out-migrant workers. All these variables are measured in 1991. Regressions results are reported in the Table 2, with columns 1-4 looking at the static (whether a village had landline installed in 1993) and columns 5-8 investigating the timing of the installation.

As consistent with our anecdotal evidence, our village total income is statistically significant. Other variables, especially the previous out-migration ratio, are all insignificant. To alleviate the concern that pre-existing difference in village wealth between the treatment and control groups may generate the differential pattern of out-migration over time, we control for a flexible time trend in out-migration generated by the pre-existing village wealth. Specifically, we interact the pre-existing village wealth with a fourth-order polynomial function of time. Moreover, we further include the interactions between the fourth-order polynomial function of time with the percentage of arable land in 1991 and whether the village was in the mountain area, the two variables having \( t > 1 \) though not statistically significant in the determinants equation.
4 Landline Telephone and Migrant Workers

4.1 Basic Results

Table 3 gives the baseline results. In column (1) we control for other factors affecting the ratio of migrant workers outside provinces only by using village and year fixed effects. The positive and significant association between newly access to landline telephone and the migrant worker measure is clear from this. Column (2) confirms that this result is not driven by pre-existing village wealth and arable land. In column (3) and column (4), we add geographic control and a rich set of demographic controls. Column (5) suggests that this result in not sensitive to province time dummies. Taken together, results in Table 3 demonstrate a consistent picture that newly access to landline telephone increases the ratio of migrant workers by around 2.1%.

Table 2. Determinants of landline installation
4.2 Robustness

The major challenge to the aforementioned DID estimation is that there are some unobserved variables — for example, local government officials’ altitude towards the control on migration — drives both the installation of landline and changes in the ratio of out-migration. While variables like these are likely to change gradually over time rather than suddenly or all at once, it is expected to identify such effects in the form that changes in out-migration would anticipate the installation of landline (see also Jensen and Oster, QJE, 2009). To check the possibility of such compounding effects, we include an indicator for installing landline next year in the regression. The result is shown in column 1 of Table 4. We formally check whether there are systematically differences between the treatment and control groups before the installation of landline, see Column 2. For the mechanism of landline, it provides information about the outside job opportunities and also timely contact with the left-behind family members. While given that the villages within the same county are quite close, we should expect there is no effect on the migration to different villages within the same county, as can be seen in Column 3. If the installation of landline and change in out-migration reflects some changes of underlying village environments, we should expect part of effects be captured by in-migration. But the result in column 4 did not provide such evidence. Column 5 uses an alternative estimation specifically, propensity score matching and DID, which give us the similar result. If we assume the error term in equations (1) and (2) follow an Extreme value I distribution, equation (3) can be derived in a logit regression form which gives us almost the same result, see column 6. Given that we have some villages through the whole sample period never installed the landline and some villages always installed landline, a comparison between these two groups of villages should find that their difference in the ratio of out-migration should be constant over time. See the Figure 4.

### Table 3. Baseline results

<table>
<thead>
<tr>
<th>Regressors</th>
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<td>0.022**</td>
<td>0.021**</td>
<td>0.019***</td>
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<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.007)</td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Village fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Province time dummies</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Log income in 1991</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>% arable land in 1991</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Mountains area (0/1)</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Demographic controls</td>
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<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
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<tr>
<td>Observations</td>
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<td>397</td>
<td>397</td>
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<tr>
<td>R-squared</td>
<td>0.064</td>
<td>0.094</td>
<td>0.106</td>
<td>0.167</td>
<td>0.327</td>
<td></td>
</tr>
<tr>
<td>Number of villages</td>
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<td>57</td>
<td>57</td>
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</tr>
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</table>

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Demographic controls include avg. income per capita, ln(population, sexratio, poor area dummy, % arable land, budget surplus, newspaper, TV, electricity
4.3 Mechanism

Long cross-region distance between migrants sending and hosting areas brings the asymmetry in labor market information and burdens the cost of communications, especially for inhabitants who are living in remote and isolated places. The installation of landline telephone in the village of origins provided a cheap and fast technology for accessing to information and communication, which can obviously lower the
job-hunting costs and the psychological costs of family separation. We check formally the two mechanisms through which the landline telephone affects out-migration, i.e., the provision of outsider job opportunities information and timely contact with the left-behind family members. For the first channel to work, we expect the effect of landline should be stronger for villages having larger number of previous out-migration workers. For the second channel to work, we expect the effect of landline should be stronger for villages having larger number of young children. Our estimation specification is

$$y_{vt} = \gamma_{vt} + \theta_{vt} + \beta_1 T_{vt} + \beta_2 T_{vt} \times \text{migrate (children)} + \varepsilon_{vt}$$ (6)

The results in Table 5 confirm that the installation of landline telephone increase the ratio of migrant workers through the provision of outsider job opportunities information and timely contact with the left-behind family members.

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<tr>
<td>Landline</td>
<td>0.009**</td>
<td>0.006</td>
<td>0.020**</td>
<td>0.016***</td>
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<tr>
<td></td>
<td>(0.004)</td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.007)</td>
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<tr>
<td>migrate\landline</td>
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<td>0.898***</td>
<td>(0.328)</td>
<td>(0.295)</td>
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<tr>
<td>children\landline</td>
<td>0.019*</td>
<td>0.016**</td>
<td>(0.010)</td>
<td>(0.007)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Village fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Province time dummies</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Table 5. Mechanisms

5 Conclusion

The main contribution of this paper is to test whether newly access to landline telephone is associated with the ratio of migrant workers using village-level data from China. Since the economic reforms in 1978, China has experienced an era of substantial and sustained rural-urban migration. Owing to the huge surplus of rural labor and regional income gap, millions of workers migrated from western and central regions of China to the coastal regions in hope for a better living (Massey et al. 1987). Unfortunately, long cross-region distance burdens the cost of job hunting and migration, especially for peasants living in rural places, where modern information technologies (like phones and Internet) are still poorly applied just a few decades back from now. As a result, the village of origin is a key site for potential migrants, who relied heavily on the annual or semi-annual home-returns of current migrants to obtain information.
about outside labor demand. However, this kind of information acquirement process not only is imprecise itself, but also leads to very costly delays.

Under this context, the installation of landline telephones in the village of origins provided a new technology for collecting labor market information, and timely communicating with left-behind family members. We exam the variations in the timing of landline installation the villages of china and estimate the impacts of new landline introduction on the ratio of migrant workers. We find that the new introduction of landline substantially influence the ratio of migrant workers in China, increasing the likelihood of migration by at least 2 percentage points. Al last, we test two mechanisms through which landline will affect migrant ratios. Our study underlines that the installation of landline telephone do help to lower the economic costs and psychological costs associated with migration, which thus increase the ratio of labors in the villages of China who seed works outside the provinces.

6 References


