



# Rural-urban circularity in China: Analysis of longitudinal surveys in Anhui, 1980–2009



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## ABSTRACT

Hundreds of millions of migrants from rural China circulate between their home villages and host cities. While existing research tends to focus on the question of permanent settlement in cities, the phenomenon of circularity which has prevailed for decades is not well understood. For example, how often do migrants return, how long do they stay before migrating again, and whether and how these behaviors have changed over time, are seldom studied. Drawing from the longitudinal migration histories of 530 rural migrants from six villages in Anhui Province and using multi-level Poisson regression models, this paper examines how rural-urban circularity has changed since the 1980s. We found that migrants who first left for migrant work in the 2000s spent less time in the home location when they return, compared to those who first left in earlier decades. Male migrants return less frequently than female migrants; and younger migrants return less than older migrants. Migrants who have had high-school education, and who have young children, a spouse, and a high-quality house at the home location tend to return more frequently and spend more time when they return than other migrants. Women's circularity is more sensitive to the number of dependent children and the decade of first out-migration than men; and men's circularity is more sensitive to education level and generation than women. Our findings underscore circularity as a fundamental attribute of rural-urban migration in China, identifies the gender and generational differences in circularity, and highlights the social and household ties that sustain migrants' motivation to return/circulate.

## 1. Introduction

The hundreds of millions of rural Chinese who work in urban areas are usually referred to as migrants but not circulators in spite of their moving back and forth between their home villages and the cities (Fan, 2016; Han et al., 2009; Schmidt-Kallert, 2009). While scholars have studied the prospect of migrant settlement in cities (Fan, 2011; Tang and Feng, 2015; Zhu and Chen, 2010), research on circularity is limited. One reason is the tendency to focus on the question of permanent settlement rather than circular migration and multilocity (Fan, 2011; Schmidt-Kallert, 2009). For example, many studies highlight *hukou* as an impediment to migrants' ability to stay in cities (Chan, 1996; Wu and Treiman, 2004). Another reason is the reliance on cross-sectional data that is less powerful than longitudinal data for analyses of circular migration.

Informed by theories and research on circular migration and recent studies on migration in China (see the next two sections), this paper seeks to answer two main research questions: (1) How has rural-urban circular migration changed since the 1980s? (2) What factors have

contributed to changes in rural-urban circularity during this period? We use the longitudinal migration histories of 530 rural workers from six villages in Anhui Province to answer the above questions. By using two-level Poisson regression models, we analyze how the frequency and duration of return migration have changed over time and how they are related to gender and individual and household characteristics.

The next section reviews existing theories about circular migration and highlights some of the factors that explain changes in circularity. It is followed by a brief overview of rural-urban migration and circularity in China. Our empirical analysis focuses on villagers' migration histories via descriptive statistics and modeling. The paper concludes with a summary of our findings.

## 2. Research on circular migration

Circular migration is not new and has been widely practiced around the world, e.g., seasonal and cyclical migration in South Pacific Islands (Bedford, 1973, 1980; Hugo, 1982), Africa (Clark et al., 2007; Collinson et al., 2006; Potts, 2010; Elkan, 1967), Southeast Asia (Hugo, 1982,

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1983; Goldstein, 1978, 1987), and India (Deshingkar and Farrington, 2009; Gidwani et al., 2003). However, conventional theories of human mobility tend to consider migration as a one-way move from an origin to a destination rather than an interactive and iterative activity involving multiple sites and communities. Therefore, circular migration is often understood as a temporary solution for low-skilled workers that will eventually vanish with economic growth (Bedford, 1973; Hugo, 1982).

At the same time, circular migration has increased between developing and developed economies (Constant and Zimmermann, 2012; Massey et al., 1994), within developed countries (DaVanzo, 1983; Gáková and Dijkstra, 2008), and among high-skilled workers (Hugo, 2008; Qin, 2015). The increased prevalence and magnitude of circular migration hints at its resilience and begs the question if such activity is merely a transitional step toward permanent settlement. Theoretically, this question challenges the assumption that migrants are unidirectional and their objective is always permanent settlement. Rather, migrants may not intend to or may not be able to establish a new permanent residence, and some may rather maintain a “multi-locational” livelihood for an extended period of time (Schmidt-Kallert, 2009).

Four theories have informed research on circular migration. “Migration transition theory” and “dual labor market theory” focus on the effect of economic structure. Migration transition theory considers circulation as a major form of migration in a “transitional society” (Zelinsky, 1971). In this vein, circular migration occurs when small-holder agriculture, agricultural surplus labor, and urban-centered industrial development coexist, and when the demand for skilled labor does not exceed the demand for unskilled labor (Guest, 1999). Transportation is an important structural factor: it improves as a society develops, and such improvement helps facilitate circulation (Acevedo et al., 2004; Hugo, 1981). Dual labor market theory highlights capital owners who use migrant labor in the secondary sector to adjust production according to economic cycles (Piore, 1980). Because there are always uncertainties and fluctuations in economic activities, this theory predicts that circular migrants are always in demand in industrial societies.

The third theory, “social network theory,” emphasizes the perpetuation of circular migration through networks of contacts that migrants have developed. These networks provide social support and reduce living costs in host areas, which helps return migrants to migrate again (Fan and Stretton, 1984). This explanation is reinforced by the theory of cumulative causation, which contends that migration sustains itself by fostering more migration (Massey, 1990).

Lastly, the “new economics of labor migration theory” (NELM) highlights circular migration as a household strategy to maximize household income and minimize risk, especially in developing economies where the capital market is under-developed, job opportunities are not sustainable, and the formal social security system is insufficient (Hugo, 1982; Stark and Bloom, 1985; Stark, 1991). Migrants move to urban areas to earn higher incomes and send back remittances to support left-behind family members, who benefit from the low cost of living in rural areas. That they continue to reside and work in rural areas makes it easier for migrant family members to return if appropriate urban work is no longer available. The above theories point to the importance of considering factors at all three levels to explain circular migration: individual, household, and structural, as illustrated by research on international migration (Massey and Espinosa, 1997; Massey and Pren, 2012; Bastia, 2011). In the next section, we shall describe the factors at all three levels in the Chinese context.

Methodologically and empirically, existing research has rarely examined the frequency and intensity of circularity. One exception is Constant and Zimmerman’s work which documents and explains the number of times a guest worker exits and the number of years he/she lives away from Germany (Constant and Zimmermann, 2007). Using a 14-year panel dataset of guest workers, they found that the frequency of circulation first decreases and then increases with age. Younger and

older migrants spend more years outside Germany once they exit than the middle-age migrants. Being married and owning a house in Germany reduce the frequency of circulation and the number of years away. It is important to note that factors which contribute to less frequent circulation do not always lead to shorter time away from Germany. For example, being female and better educated reduces the number of exits but does not significantly affect the number of years away from Germany. Speaking the local language shortens the time away from Germany but does not affect the frequency of circulation. Having a spouse living outside Germany encourages guest workers to spend more years away from Germany once they exit the country, but it does not significantly affect the frequency of circulation. While a drawback of Constant and Zimmerman’s work is that it does not consider whether circularity changes over time, its analysis of the frequency of circulation and the amount of time a migrant spends in different locations provides an appropriate analytical tool for this paper’s empirical analysis.

### 3. Rural-urban circularity in China

China’s level of urbanization was only 18% in 1978 and it skyrocketed to 56% by 2015 (Jiang, 2013: 23; Wu, 2016), largely attributable to massive rural-urban migration. The “floating population,” referring to migrants who are living in places different from where they are officially registered, amounted to about 300 million or about 22% of the population in 2015 (NBS, 2015). Most of them are from rural origins working in urban areas, and circular migration is a prominent feature among them (Bai and He, 2003; Fan, 2011; Han et al., 2009). Specifically, these migrants do not tend to settle down in urban destinations but instead circulate back and forth while maintaining a household split between the city and the countryside (Fan, 2011, 2016). Such practice has continued for years and even decades and has become a norm among rural Chinese.

It is widely accepted that Chinese migrants’ circularity is due to the household registration (*hukou* 户口) system (Chan, 1996; Cheng, 2008; Li, 2003; Wang, 2013), which severely limits rural migrants’ access to social benefits such as subsidized housing, health care, and education in host cities. Recent research has also highlighted circular migration as a household strategy that aims at maximizing household income while guarding migrants’ economic and social resources in the countryside (Fan and Wang, 2008; Fan, 2009, 2011; Fan et al., 2011; Hu et al., 2011; Zhu, 2003, 2007; Zhu and Chen, 2010). Most empirical studies on circular migration in China have focused on the presumed progression from circularity to settlement, seeking to explain for a strong settlement intention (Fan, 2011; Tang and Feng, 2015; Zhu, 2007; Zhu and Chen, 2010) or a high probability of becoming a permanent resident (Hu et al., 2011; Mendoza, 2008; Poston and Zhang, 2008; Sun and Fan, 2011).

However, due to the paucity of longitudinal data, we know little about the intensity of circular migration, whether and how it has changed over time, and what factors affect the frequency of circularity. Longitudinal data is needed also because both migrants’ composition and behavior have changed. First, new-generation migrant workers (generally referring to those born after 1980) have accounted for more than half of the migrant population since the early 2000s, and their proportion is growing (NBS, 2011; NPFPC, 2015). Second, unlike the 1980s and 1990s when migrants tended to leave the spouse behind, it is increasingly common for migrants to pursue urban work together with the spouse (couple migration) and even bring their children along (family migration) (NBS, 2014; Zhou, 2004). Third, it appears that the length of time that migrants spend in cities has increased over time (Duan et al., 2013; NPFPC, 2015).

All the above changes seem to point to less frequent rural-urban circulation over time. Specifically, new-generation migrant workers have expressed a stronger preference for urban life than older migrants (Tang and Feng, 2015; Wu and Xie, 2006); migrating with family

members reduces the need to return to the home villages (Shang and Yu, 2014); and migrants' spending more time in cities implies increased stability there (Duan et al., 2013). Nevertheless, research has also shown that new-generation migrant workers still tend to plan to eventually return to the countryside (Yao, 2010; Yue et al., 2010), and that migrating with family members does not significantly affect migrants' settlement intention (Fan, 2011).

A better understanding of rural-urban migration in China requires analyses that document and explain circular migration and its changes over time. While research on circular migration tends to define it as repeated migration involving out-migration, return, and at least one additional out-migration (Fargues, 2008; Hugo, 2005; Vadean and Piracha, 2009; Wickramasekara, 2011), studies on China often treat circular migration the same as temporary migration, meaning migration without a change in *hukou* status (Connelly et al., 2010; Hu et al., 2011; Jia, 2006). In this paper, we define circular migration as having at least one return (moving out from the home village for more than six months and returning for more than six months). This definition allows us to include the new-generation rural workers in the analysis because they might not have had enough time to migrate again after their first return, given their young age and recent onset of out-migration.

As described earlier, factors at the individual, household and structural levels all affect migration and circularity (Bai and He, 2003; Ma, 2001; Massey, 1990; Zhao, 2002). In the context of China, individual characteristics including rural workers' age, gender, generation/cohort and education level have been shown to significantly affect their economic wellbeing as well as their settlement intention (Duan and Ma, 2011; Hu et al., 2011; Li, 1997; Xue, 2012). In particular, the literature has highlighted gender as a key factor that shapes migration behavior. For example, rural women's likelihood to participate in migrant work declines sharply after getting married and especially after having children, while men's likelihood to do so is usually only constrained by physical and age factors (Jacka, 2006; Yang and Guo, 2000). Household characteristics including the number of children, migration status of the spouse and children, availability of grandparents, housing and the size of farmland in the countryside, are important indicators of migrants' considerations and strategies (Fan, 2011; Hagan et al., 2008; Wang and Zhao, 2013; Zhu, 2007). Structural factors such as labor market demand and social and economic policies which have changed over time also affect migration and circularity (Chan, 2010; Chan et al., 2010; Wang, 2010).

#### 4. Data and variables

Research on circularity requires longitudinal information that most census-type surveys do not provide. We are fortunate to have participated in and have access to a longitudinal study of 150 rural households in Anhui province, which was launched in 1995 by the Research Center for Rural Economy (RCRE) of China's Ministry of Agriculture. Semi-structured questionnaires guided face-to-face interviews with each of the 150 selected households. Our partnership with Renmin University enabled further interviews with the same households ten years later, in 2005. Further interviews between 2009 and 2014 supplemented information since 2005 and up to 2009.<sup>1</sup> Such repeated interviews allowed us to create a panel dataset for the period from 1980 up to 2009.

Anhui was chosen for our study because it was (and still is) a major sending province of migrant workers. When the project began in 1995, two counties, referred simply as Y and Z and located in respectively the northwest and southeast of Anhui, were selected based on three criteria: (1) compared with other counties, Y and Z had relatively long histories of out-migration; (2) out-migration accounted for at least 20 percent of

the rural labor force in both counties; (3) Y and Z were representative of Anhui counties that had sent out rural-urban migrants, in terms of economic development. In each county, three villages were selected to represent different levels of economic development. Having said that, all the villages selected share several similarities. First, per capita farmland is small. Second, out-migration to work has been commonplace and has become a normal way of life or even culture of the villagers. Third, most of the migrant workers from the villages have gone to the Yangtze Delta area, such as Suzhou, Wuxi, Ningbo, and Shanghai, for these destinations' employment opportunities and relative proximity. In each village, 25 households were selected: 15 households where at least one member had had migration experience by 1995; and 10 households where no one had had migration experience by 1995. In other words, the survey included a total of 150 households from six villages in two counties in the province. Over time, these households have become increasingly similar: by 2009 almost all had at least one family member who had had migration experience.

The survey includes information on members of the household, their demographic characteristics and migration histories. Notably, each interview includes also retrospective information, thus enabling a longitudinal record of both individuals and households. The narratives, culminating into about 1000 pages of text, which after coding make it possible to document individuals' migration history and other time-varying variables for each year over their life cycles. While interviewees may not explain directly why they make certain mobility decisions, such as why they decide to do migrant work and why they return at a particular time, the longitudinal data permits statistical analyses that assess the relationship between those decisions and factors at individual, household and structural levels.

Our dataset includes all household members mentioned in the interviews, amounting to a total of 843 individuals. The centerpiece of the dataset is a continuous record of individuals' migration status and other characteristics in year-intervals from 1980 to 2009, when such information is available. Specifically, migration status is a dichotomous variable coded as "inside" or "outside" for all individuals in the dataset. This inside-outside binary largely represents also the dichotomy between rural and urban locations and between rural and urban work. The binary also is consistent with how rural Chinese typically speak in terms of "being outside that year" or "being inside (at home) that year." For the purpose of coding, when an individual stays within the boundary of his/her home "town" (*zhen* or 镇), which may incorporate a number of villages, for more than six months continuously out of a calendar year, we code his/her migration status as "inside." Even if an individual works in the town and not the home village, he/she very likely commutes to and live in the village and is therefore considered "inside." Otherwise, the migration status is coded "outside." By using the six-month criteria, we exclude short-term moves, such as returns for the Chinese New Year. Being away for six months is also the standard definition of "migrant worker" used by China's National Bureau of Statistics and by many migration studies on China (Knight et al., 2011; NBS, 2016).

To examine the frequency of circularity, in this paper we focus on rural-urban migrants, defined as individuals who have rural *hukou*, are within the working ages of 15–64, are not in school, prison or the military, and had moved outside at least once after age 15. Of the 843 individuals in the dataset, 530 are rural-urban migrants using this definition. Following Constant and Zimmermann's (2007) work on circular migration of immigrants in Germany, we compute the number of returns a rural migrant has undertaken as well as the number of years inside during an observation period. A return refers to the change of migration status from outside to inside. An observation period refers to the period between the year when a subject turns 15 and the year of observation, which is always some year between 1980 and 2009. At the end of each observation period, we record the number of returns and the number of years inside a rural migrant has had during the period, as well as his/her individual characteristics and household characteristics.

<sup>1</sup> While the original survey included also Sichuan province, data on Sichuan is not included in this paper because the quantitative coding of those interviews is not yet available.

We refer to this record as an “observation.” The vast majority of rural migrants in the dataset have more than one observations.

The number of returns and number of years inside serve different analytical purposes. The former documents the intensity of circularity. When the number of returns changes from 0 to 1, a migrant completes a circuit of migration. The more returns a migrant conducts within a certain period, the more frequently the migrant circulates. The number of years inside, on the other hand, represents the relative importance of the hometown to rural-urban migrants.

The 530 rural migrants contribute in total 5815 observations. The observation period ranges from one year to 30 years, averaging 11 years. Of all the observations, 3637 (62.6%) record no returns, representing young migrants who have not yet returned or individuals of any age who have never returned during the period recorded. Our examination of the data shows that most are from the former group. Of all the observations, 1809 (31.1%) show one return; 320 (5.5%) two returns; 39 (0.7%) three returns; 10 (0.2%) four returns.

To examine how rural-urban circularity has changed over time, we have identified “decade of the first out-migration” as an explanatory variable. If the intensity of rural-urban circularity has indeed declined over time, then we would expect migrants who undertook their first migration in recent decades to return fewer times and spend shorter time when they return than migrants in earlier decades.

We also include a standard set of individual and household characteristics as independent variables. Individual characteristics include age, age squared, gender, generation, and education level. Age refers to the age in the year of observation. Based on the birth year, a rural migrant is further categorized as old-generation (born before 1965), mid-generation (born between 1965 and 1979), or new-generation (born in or after 1980). Education level records the highest education level an individual has obtained by the year of observation.

Four household characteristics are included. The first three represent the household arrangement in the year of observation: the number of dependent (younger than 15) children who are inside, whether the subject has a spouse inside and whether the subject has a parent inside, the latter two being dummy variables. The fourth variable is rural housing, which refers to whether, in the year of the observation, the migrant’s household has a “brick-and-earth” house (*zhuantu fang* 砖土房); a “red-brick” house (*hongzhuan fang* 红砖房); or a “brick-and-concrete house” (*zhuanhun fang* 砖混房). Brick-and-earth houses are usually not in good condition and are considered the least desirable; red-brick houses are newer and more desirable; and brick-and-concrete houses tend to be the newest and most preferred. Migrants in our survey frequently mentioned building a “brick-and-concrete house” as an important reason for both migration (to increase income) and return (to build the house). To control for the potential effect of the home village, we include also five village dummy variables.

It is important to note that the length of observation period is different across observations in our sample. The longer an individual is observed, the more years he/she is “exposed to the risk” of return and being inside. Thus, the length of observation period must be offset. To that effect, we include two exposure variables in the data estimation. The length of observation period is used as the exposure variable for modeling the number of years inside. We also create “the maximum possible number of returns (during the observation period)” for each observation and use it as the exposure variable for modeling the number of returns.

Because the primary data from the survey is in the form of narratives and not from a formal questionnaire, it is limited by incomplete information for certain variables such as migration distance, migrant jobs and size of farmland, which can potentially affect frequency and duration of return. Having said that, all the six villages share similarities that suggest that the absence of these variables has not unduly affected our results. First, per capita and per household farmland is small. Although no official data exists about the size of farmland in Y and Z, a report published by Anhui provincial government in 2014

documented that even after years of farmland conservation and expansion, the per capita cultivated land in Anhui was only about 1.30 mu,<sup>2</sup> lower than the national average of 1.52 mu ([Department of Land and Resources of Anhui Province, 2014](#)). Second, most of the migrant workers from the villages have gone to the Yangtze Delta area, such as Suzhou, Wuxi, Ningbo, and Shanghai, for these destinations’ employment opportunities and relative proximity. Third, most migrants work in low-paid and low-skilled jobs such as construction, factory manual work, and domestic work. Nevertheless, if longitudinal data with sufficient information about such variables is available, the analysis would have been more complete.

## 5. Descriptive statistics

**Table 1** presents the summary statistics (means and standard deviations) of the selected variables. The statistics are tabulated separately for the entire sample, male migrants, and female migrants. Among the 5815 observations, 39% began the first out-migration in the 1980s, 40.5% in the 1990s, and 20.5% in the 2000s. Male migrants accounted for 64.1% of the observations. The average age of the observations is 32.8, and among them 34% are of the old-generation, 49% mid-generation, and 17% new-generation. The modal education level is junior high which accounts for 52.4% of the observations. In terms of household characteristics, by the end of the observation period, migrants on average have 0.7 young children inside, 36% of them have a spouse inside, 60.9% have a parent inside, 23.1% own a brick-and-earth house, 35.8% own a red brick house, and 41% own a brick-and-concrete house. In terms of the home village, 16.8% of the observations are from Village Y1, 18.2% from Y2, and 21.3% from Y3, all in the northern part of Anhui. From the southern part of the province, Village Z1 accounts for 15.6%, Z2 13.2%, and Z3 14.9% of the observations. On average, each migrant has had 0.5 returns and been inside for about two years. The average values of the two exposure variables—the maximum possible number of returns and the length of observation—are 4.7 times and 9 years respectively.

The male and female samples of our data appear to be different in many aspects. The majority of the male migrants (53.0%) first out-migrated in the 1980s, while the majority of female migrants (52.1%) first out-migrated in the 1990s. The 2000s accounted for 33.9% of female migrants’ first out-migrations and only 13% of male migrants’ first out-migrations. Along the same vein, higher proportions of female migrants than male migrants belong to the mid and new-generation groups, and male migrants are on average three years older than female migrants. These differences show that in general rural women’s participation in out-migration occurred more recently than men’s. On average male migrants are better educated than female migrants. Female migrants have fewer young children inside, are less likely to have a spouse inside, and are much more likely to have parents inside than male migrants, all pointing to caregiving responsibilities that tend to deter women’s migration more so than men’s. Female migrants are less likely to have a red-brick house or brick-and-concrete house than male migrants, suggesting that the former are in greater economic need than the latter. On average, male migrants return 0.5 times and spend 2.1 years inside, and female migrants return 0.4 times and spend 1.7 years inside. Male migrants’ maximum possible number of returns is 5.3 times, compared to 3.7 times for female migrants. These differences may in part reflect the different lengths of observation by gender: male migrants are observed about 3 years longer than female migrants.

## 6. Modeling circularity

Since our panel data comprises observations of the same subject over time, in order to predict the dependent variables, it is necessary to

<sup>2</sup> 1 mu ≈ 666.7 square meters.

**Table 1**  
Selected sample characteristics.

Variables	All		Male migrants		Female migrants	
	Mean	SD	Mean	SD	Mean	SD
<b>Time</b>						
Decade of the first out-migration						
1980–1989	0.390	0.488	0.530	0.499	0.140	0.347
1990–1999	0.405	0.491	0.340	0.474	0.521	0.500
2000–2009	0.205	0.404	0.130	0.337	0.339	0.473
<b>Individual Characteristics</b>						
Male	0.641	0.480				
Age	32.777	11.437	33.827	11.826	30.900	10.450
Age squared	1205.119	853.824	1284.072	901.544	1063.980	740.617
Generation						
Old-generation	0.340	0.474	0.410	0.492	0.214	0.410
Mid-generation	0.490	0.500	0.469	0.499	0.529	0.499
New-generation	0.170	0.375	0.121	0.326	0.257	0.437
Education level						
Below primary school	0.091	0.288	0.060	0.238	0.147	0.354
Primary school	0.278	0.448	0.232	0.422	0.360	0.480
Junior high	0.524	0.499	0.575	0.494	0.433	0.496
Senior high	0.106	0.308	0.132	0.339	0.060	0.237
<b>Household Characteristics</b>						
No. of children (age < 15) inside	0.669	0.911	0.717	0.936	0.582	0.858
Having a spouse inside	0.360	0.480	0.479	0.500	0.146	0.353
Having a parent inside	0.609	0.488	0.582	0.493	0.658	0.474
Rural housing						
Brick-and-earth	0.231	0.422	0.188	0.391	0.308	0.462
Red-brick	0.358	0.480	0.373	0.484	0.332	0.471
Brick-and-concrete	0.410	0.492	0.439	0.496	0.360	0.480
<b>Village</b>						
Y1	0.168	0.374	0.178	0.382	0.150	0.357
Y2	0.182	0.386	0.173	0.378	0.199	0.399
Y3	0.213	0.409	0.209	0.407	0.219	0.414
Z1	0.156	0.363	0.164	0.371	0.140	0.347
Z2	0.132	0.339	0.138	0.345	0.123	0.328
Z3	0.149	0.357	0.138	0.345	0.169	0.375
No. of returns	0.448	0.647	0.483	0.678	0.386	0.582
No. of years inside	1.965	3.875	2.122	4.113	1.686	3.389
Maximum possible no. of returns	4.740	3.327	5.304	3.529	3.732	2.648
Length of obs.	8.958	6.666	10.089	7.069	6.934	5.307
Sample size	5815		3729		2086	

use a model that can accommodate time-varying variables. We chose two-level random-intercept Poisson regression models (Rabe-Hasketh and Skrondal, 2012) with four specific steps. First, our dependent variables are counts, which are always non-negative integers. Since counts follow a Poisson distribution and our dependent variables show no over-dispersion,<sup>3</sup> we use Poisson regressions as our count model (Gardner et al., 1995). Second, we adopt two-level models in recognition of the fact that different subjects may respond to various combinations of factors differently. The first level is the observation of a rural migrant, which may account for some of the variance in the dependent variables. The second level is the rural migrant, whose characteristics may also account for some of the variance. Third, by using a random-intercept, we allow the probability of return to vary across different migrants. Finally, we tested for multicollinearity by running an ordinary least squares regression using the same dependent and independent variables. The variance inflation factors suggest that correlations among independent variables have not unduly biased the models' estimates. We estimated the models using STATA 14.0.

<sup>3</sup> We calculated the dispersion parameter (alpha) for each dependent variable. They have an alpha of 0, which indicates no over-dispersion.

## 7. Modeling results

Table 2 summarizes the regression results at the observation level, with the individual-level variance controlled. Models (1), (3), (5) and (7) use the number of returns as the dependent variable; and models (2), (4), (6), and (8) use the number of years inside as the dependent variable. Models (1) to (4) were estimated using the entire sample, models (5) and (6) the male sample, and models (7) and (8) the female sample. All eight models are statistically significant. To conserve space and for the sake of interpretation, we show the regression results as incident rate ratios (IRR).

Models 1 and 2 include only “decade of the first out-migration” as the independent variable and village dummies as control variables. These two models suggest that migrants who first migrated in recent decades, especially after 2000, have undertaken fewer returns and spent shorter time inside than those who first migrated in earlier decades. However, when other individual and household variables are included, in models 3 and 4, the decade effect is no longer significant except for migrants who first out-migrated after 2000 who spent significantly shorter time inside when they return compared to migrants who first out-migrated in the 1980s. Models 3 and 4 also suggest that holding everything else constant, factors which affect the number of returns and factors which affect the length of time a migrant spends inside are not always the same. Being male decreases the incident rate of return by 51% and the percentage of years inside by 66%. Aging by

**Table 2**  
Two-level Poisson regression results.

	Entire sample				Male migrants		Female migrants	
	No. Returns Model (1)	No. Years inside Model (2)	No. Returns Model (3)	No. Years inside Model (4)	No. Returns Model (5)	No. Years inside Model (6)	No. Returns Model (7)	No. Years inside Model (8)
<b>Level 2 Variables</b>								
<b>Time</b>								
Decade when the first out-migration started								
1990–1999	0.820 (0.230)	0.488 <sup>*</sup> (0.198)	1.229 (0.352)	0.824 (0.342)	1.729 (0.628)	1.423 (0.735)	0.572 (0.279)	0.204 <sup>**</sup> (0.155)
2000–2009	0.335 <sup>***</sup> (0.105)	0.0909 <sup>***</sup> (0.0408)	0.740 (0.264)	0.245 <sup>***</sup> (0.124)	1.325 (0.738)	0.504 (0.388)	0.385 (0.200)	0.0709 <sup>***</sup> (0.0568)
<b>Individual Characteristics</b>								
<b>Male</b>								
			0.490 <sup>***</sup> (0.121)	0.339 <sup>***</sup> (0.119)				
<b>Generation</b>								
Mid-generation			0.355 <sup>***</sup> (0.101)	0.345 <sup>***</sup> (0.138)	0.280 <sup>***</sup> (0.108)	0.253 <sup>**</sup> (0.136)	0.652 (0.261)	0.686 (0.397)
New-generation			0.137 <sup>***</sup> (0.0558)	0.169 <sup>***</sup> (0.0942)	0.0432 <sup>***</sup> (0.0294)	0.0392 <sup>***</sup> (0.0358)	0.465 (0.234)	0.856 (0.596)
<b>Education level</b>								
Primary school			1.426 (0.580)	2.029 (1.187)	1.274 (0.922)	2.087 (2.140)	1.248 (0.532)	1.655 (1.091)
Junior high			1.232 (0.502)	1.674 (0.981)	1.356 (0.961)	2.189 (2.196)	0.894 (0.395)	1.083 (0.734)
Senior high			2.699 <sup>**</sup> (1.332)	5.771 <sup>**</sup> (4.064)	4.430 <sup>*</sup> (3.447)	13.82 <sup>**</sup> (15.20)	1.255 (0.810)	2.003 (1.920)
<b>Level 1 Variables</b>								
<b>Individual Characteristics</b>								
<b>Age</b>								
			0.992 (0.0162)	1.056 <sup>***</sup> (0.00924)	1.005 (0.0191)	1.042 <sup>***</sup> (0.0106)	0.948 (0.0322)	1.081 <sup>***</sup> (0.0215)
Age squared			1.000 (0.000207)	1.000 <sup>**</sup> (0.000106)	1.000 (0.000237)	1.000 (0.000121)	1.001 <sup>*</sup> (0.000464)	1.000 (0.000266)
<b>Household Characteristics</b>								
<b>No. of children (age &lt; 15) inside</b>								
			1.075 <sup>**</sup> (0.0326)	1.077 <sup>***</sup> (0.0158)	0.997 (0.0374)	1.020 (0.0189)	1.284 <sup>***</sup> (0.0694)	1.229 <sup>***</sup> (0.0322)
Having spouse inside			1.446 <sup>***</sup> (0.0928)	1.341 <sup>***</sup> (0.0441)	1.501 <sup>***</sup> (0.120)	1.395 <sup>***</sup> (0.0602)	1.479 <sup>***</sup> (0.163)	1.295 <sup>***</sup> (0.0675)
Having a parent inside			0.910 (0.0846)	1.060 (0.0506)	0.935 (0.102)	1.057 (0.0615)	0.901 (0.161)	1.133 (0.0960)
<b>Rural housing</b>								
Red-brick house			1.211 (0.324)	1.490 (0.544)	1.491 (0.580)	1.862 (0.963)	0.971 (0.331)	1.115 (0.556)
Brick-and-concrete house			1.650 <sup>**</sup> (0.327)	2.471 <sup>**</sup> (0.562)	2.030 <sup>**</sup> (0.561)	3.113 <sup>***</sup> (0.952)	1.501 (0.415)	2.214 <sup>**</sup> (0.757)
<b>Village</b>								
Y2	1.454 (0.564)	1.495 (0.823)	1.348 (0.510)	1.336 (0.723)	1.130 (0.596)	0.887 (0.660)	1.419 (0.723)	1.789 (1.375)
Y3	1.459 (0.545)	1.376 (0.728)	1.379 (0.493)	1.211 (0.617)	1.577 (0.787)	1.345 (0.945)	1.218 (0.577)	1.165 (0.831)
Z1	1.520 (0.608)	1.673 (0.948)	1.468 (0.574)	1.644 (0.915)	0.845 (0.471)	0.708 (0.555)	2.668 <sup>*</sup> (1.371)	4.532 <sup>*</sup> (3.492)
Z2	0.573 (0.250)	0.440 (0.269)	0.518 (0.218)	0.413 (0.247)	0.257 <sup>**</sup> (0.157)	0.169 <sup>**</sup> (0.144)	1.141 (0.616)	1.155 (0.936)
Z3	1.143 (0.474)	1.152 (0.678)	1.187 (0.464)	1.354 (0.755)	0.818 (0.468)	0.741 (0.596)	1.570 (0.774)	2.351 (1.751)
Constant	0.0273 <sup>***</sup> (0.00929)	0.0273 <sup>***</sup> (0.0132)	0.0528 <sup>***</sup> (0.0326)	0.00496 <sup>***</sup> (0.00374)	0.0203 <sup>***</sup> (0.0177)	0.00213 <sup>***</sup> (0.00236)	0.114 <sup>**</sup> (0.107)	0.00387 <sup>***</sup> (0.00430)
<b>Model Chi-square</b>	21.52	37.10	135.53	452.56	96.28	261.72	69.77	244.51
<b>Number of observations</b>	5815	5815	5815	5815	3729	3729	2086	2086
<b>Number of migrants</b>	530	530	530	530	283	283	247	247

St.d in parentheses.

\* p < 0.1.

\*\* p < 0.05.

\*\*\* p < 0.01.

one year increases the incident rate of being inside by 5.6%, but does not affect the frequency of returns. The relationship between age and the incident rate of being inside is linear, reflected by the significant coefficient of age-squared as 1.0. This suggests that as a migrant gets older, he or she will spend more time inside. Compared to old-

generation migrants, being a mid-generation migrant reduces both the incident rate of return and being inside by about 65%. Also compared to the old-generation, being a new-generation migrant reduces the incident rate of return by 86% and being inside by 83%. As for education, only the senior high level affects circularity. Compared to a migrant

who has no formal education experience (below primary school), a migrant who has attended senior high has an incident rate of return that is 2.7 times higher and an incident rate of being inside that is 5.8 times higher. This result may be related to the fact that better-educated migrant workers are likely to make use of their migration experiences in their hometowns more easily than migrants with lower education level. Our interviews show that among rural migrants with senior high education level who have returned, some have tried to run small businesses in the hometown and others are employed in nearby towns as civil servants or village officers. Being closer to the family is apparently a reason for their return, despite the fact that their income may suffer compared to migrant work.

Models 3 and 4 show that in terms of household characteristics, having one additional child under the age of 15 increases both the incident rate of return and being inside by about 8%. Having a spouse inside increases the incident rate of return by 45% and being inside by about 34%. Having a parent inside does not affect either dependent variable significantly.

In terms of rural housing, owning a brick-and-concrete house increases both the frequency of return and the time inside. This may be related to the migrants' success in earning remittances that fund the houses and to the degree of satisfaction they have with the houses. A brick-and-concrete house tends to be the most desirable kind of house and a symbol of success, and in that light migrants may be motivated to return permanently, or at least more often and be inside longer.

We run the same models for the male sample in models (5) and (6), and for the female sample in models (7) and (8), in order to compare how circularity varies by gender. Interestingly, being from the younger (mid and new) generations affects only a male migrant's circularity but not a female migrant's. However, when the first out-migration started affects only a female migrant's circularity but not a male migrant's. Education level also affects only men but not women. These differences to some extent suggest that rural men's growing participation in the urban labor force is sensitive to changes of their personal attributes, such as being new-generation or changes of their human capital, while rural women's participation is more related to job opportunities in urban areas. Meanwhile, the number of children inside affects only female migrants' circularity by encouraging them to return more frequently and to spend more time inside, but has no effect on male migrants' circularity. This finding underscores the persistence of gender division of labor in Chinese rural households, namely, a wife is in charge of the inside work, such as taking care of children, while a husband is in charge of the outside work, such as working in cities to provide financial support for the family (Jacka, 2006).

## 8. Summary and conclusion

Different from the conventional focus on migration as primarily a step toward permanent settlement, this paper has foregrounded circularity as a core practice of rural Chinese, highlighting the frequency and duration of migrants' returns. Using the inside-outside framework, where inside refers to the rural and outside refers to the urban, our analyses have also identified salient changes in rural-urban circularity over the past three decades. Drawing from the longitudinal migration histories of 530 rural-urban migrants from six villages in Anhui province, and using two-level Poisson regression models, we have found that in the more recent decade (2000–2009), migrants spent significantly less amount of time inside (their home location). This suggests that urban job opportunities have become increasingly important to rural-urban migrants, and also that over time migrants have developed skills and strategies that allow them to stay longer in the city.

Our analyses have also found that individual characteristics that reduce the frequency of returns and the length of time inside include being male, new-generation, and not having attended senior high school. Conversely, female migrants, older migrants and migrants with senior high school education level tend to spend longer time inside.

Household characteristics such as having more dependent children inside, having a spouse inside, and having a high-quality rural house also increase the frequency of return and the length of time inside.

Comparing men's and women's circularity, we found that generation and education level affect only men but not women, while decade of the first out-migration affects only women but not men. These results suggest that rural women's participation in migrant labor force is more sensitive to increase in job opportunities in urban areas, while men's participation in migration work is more affected by their generational characteristics and human capital.

Gender division of labor persists, as indicated by men's spending less time inside and women's returning to the countryside more often, probably related to giving birth and care-giving. As expected, migrants whose spouses are inside tend to spend more time inside and circulate more often. Circularity is therefore a function of household arrangement: left-behind spouses and children encourage circular migration and longer time inside. While our data does not permit direct observation of return reasons, our analyses confirm that circularity is related to individual and household factors.

Our analyses also points to migrants' increasing tendency to spend longer periods outside. This may reflect the fact that new-generation migrants have become the majority among rural-urban migrants and that they are more likely to migrate with a spouse than older migrants (Liang et al., 2014; NPFPC, 2015; NBS, 2015). However, it is important to note that the migration histories of rural Chinese are still evolving. As migrants age, it is possible that return migration will increase and migrants will spend more time in the countryside (e.g. Jiang, 2013; NPFPC, 2015). In addition, the dramatic increases in urban housing price in recent years have made it extremely difficult for migrant workers to purchase a house in cities, especially in large cities. As long as owning a good house continues to be an important goal for migrants and their family members, circularity will persist. Absent pension and a social safety net, circular migration is a reasonable practice of migrants who can access urban work as well as maintain a satisfying living in the countryside.

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