DISCUSSION PAPER SERIES

IZA DP No. 7727

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November 2013

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

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Discussion Paper No. 7727
November 2013

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IZA Discussion Paper No. 7727
November 2013

ABSTRACT

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This paper examines how left-behind children influence return migration in China. We first present a simple illustrative model based on Dustmann (2003) that incorporates economic and non-economic motives for migration duration (or intentions to return), among which are parents' concerns about the well-being of their left-behind children. We then propose two complementary empirical tests based on data we collected from rural households in Wuwei county (Anhui province) in fall 2008. We first use a discrete-time proportional hazard model to estimate the determinants of migration duration for both on-going migrants with an incomplete length of duration and return migrants with a complete length of duration. Second, we apply a binary Probit model to study the return intentions of on-going migrants. Both models yield consistent results regarding the role of left-behind children as a significant motive for return. First, left-behind children are found to draw their parents back to the village, the effect being stronger for pre-school children. Second, sons are found to play a more important role than daughters in reducing migration duration.

JEL Classification: J61, J13, C41, C25, O53

Keywords: return migration, migration duration, left-behind children, discrete-time duration analysis, China

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1. Introduction

Economic development is often combined with the transfer of a large proportion of workers from the rural-based traditional agricultural sector to the urban industrial sector. China has been witnessing such a massive internal transfer since the mid-80s. The latest official figures from the Sixth National Population Census released in April 2011 estimate the total number of rural migrant workers to be 261.4 million in 2010[1]. Such large-scale internal migration results from a series of institutional and structural changes along with rapid industrialisation. Before the reforms started in 1978, labour mobility was strictly controlled. Since then, the government policy has loosened, moving from permitting rural labour mobility, to guiding rural labour mobility and then encouraging rural labour mobility (Wang and Cai, 2009). Thanks to the relaxation of various regulations, people are, in principle, free to move to places they want (Zhang, 2010) and to live and work in cities as long as they want (Fan *et al.*, 2011).

However, while labour mobility in China has dramatically increased over time, temporary migration dominates population movements that are shaped by the strong institutional constraint imposed by the household registration system (*Hukou*). Formally established in 1958, this system requires every Chinese citizen to be registered according to

[1] In Chinese statistics, rural migrants are persons working and living outside the town of their household registration for a period over six months. Of the total figure, 40 million were working within their municipality or prefecture-level city, and 221.4 million were working farther from home. Compared with the 2000 Fifth National Population Census, the population in the second category rose by 81 percent over the 10-year period. http://www.stats.gov.cn/english/newsandcomingevents/t20110428_402722244.htm.

her place of permanent residence and occupation (agricultural *versus* non-agricultural)[2]. As argued by Knight and Song (2005), it functions as a "de facto internal passport system" that confers different legal rights to residents. In villages, residents are given rights to land for farming and housing, while in cities residents are given access to urban jobs and rights to a package of welfare and social benefits. Though the system has been reformed in terms of labour mobility, access to public services remains deeply tied to the household registration place, to the disadvantage of migrants. This is notably the case for children's education. Because the education budget for the nine-year compulsory education in China is allocated through local governments and is not transferable, urban schools with a limited education budget are reluctant to accept rural migrant children unless their parents compensate for the additional cost. Hence, although rural migrant children are not officially denied access to the urban public school system, parents are requested to pay "education endorsement fees" (*jiaoyu zanzhu fei*) for children attending school in places other than their place of household registration, and the amount of such fees can be prohibitive for poor migrant families (Lai and Chen, 2010). At the non-compulsory senior high school level, additional registration place-based constraints also apply because the education policy requires students to take the university/college entrance examination in their *hukou* registration area[3]. A direct consequence of such administrative and financial barriers is that migrant's children are often left behind in rural home regions as long as they are enrolled in the education system and

[2] See Chan and Buckingham (2008) for a detailed description of the household registration system, both historically and in light of the recent waves of reform.

[3] The examination system is not uniform across China, and its implementation varies greatly at the provincial level. In 1987, the Shanghai municipality pioneered in designing its own university entrance examination. Since then, increasingly more provinces have set up an independent decision system. By 2005, 14 provinces and municipalities were independently deciding the content of their university entrance examinations. (http://www.china.com.cn/education/zhuanti/hfgk30/2007-05/29/content_8316780.htm) (in Chinese).

looked after either by one parent or by grandparents or relatives. As reported by Fan et *al.* (2011), when their parents are available to help, migrants declare a preference to leave school-age children behind for easier access to education in the countryside.

Because increasingly more people are involved in internal migration, the number of "left-behind" children (*liushou ertong*) is also increasing dramatically. According to the All China Women's Federation, there were a total of 58 million left-behind children in rural China in 2009, of which more than 40 million were below the age of 14[4]. Together with another 19 million living with their migrant parents in cities, the two groups account for approximately one-quarter of all children in China (Chan, 2009), and, compared with 2006, the number of left-behind children in 2009 is nearly triple[5]. Data gathered as part of the Rural–Urban Migration in China and Indonesia (RUMiCI) project confirm that many migrant children grow up away from their parents: in 2007, approximately 60% of the migrant children aged 16 and below were left behind in the rural hometown (Gong *et al.*, 2008).

As argued by Rossi (2008), leaving children behind is a source of a potentially high "social cost of migration", although migration may also confer benefits to the left-behind family through remittance transfers that relax budget constraints and thereby increase health and education opportunities (Cox Edwards and Ureta, 2003; Rapoport and Docquier, 2006). Migration can affect children in various dimensions. Children who grow up either with a single parent or with grand-parents or relatives may suffer from a lack of parental care that adversely affects their educational outcomes (Frisancho Robles and Oropesa, 2011; McKenzie and Rapoport, 2011). Moreover, the break-up of the family unit can create material and

[4] http://www.gov.cn/jrzg/2009-05/27/content_1325494.htm (in Chinese).
[5] http://english.peopledaily.com.cn/90001/90782/6818318.html.

psychological insecurity that affects the well-being of children left behind. For China, there is small body of literature that examines the well-being of left-behind children by focusing on different facets of living arrangement outcomes, such as school performance and health condition[6]. Mixed results have been found regarding the effect of migration on children's school performance. Using data from the 2006 China Health and Nutrition Survey (CHNS), Lee (2011) shows that migrant children are worse off in terms of school enrolment and years of schooling compared with children whose parents do not migrate. Using the 2007 RUMiCI data, Gong *et al.* (2008) compare the school performance of migrant children who live in cities with those left behind and find that the latter perform better. In contrast, using survey data from 36 primary schools in Shaanxi province in 2006, Chen *et al.* (2009) do not find any significant negative impact of migration on school performance. With respect to health outcomes, Gao *et al.* (2010) find that parental migration is a risk factor for unhealthy behaviours amongst adolescent school children in rural China. Gong *et al.* (2008) report better conditions for migrant children living with their parents in cities compared with children left behind. Finally, Kong and Meng (2010) find that children of migrants (either left behind or in cities) are less likely to have good education and health outcomes compared with rural non-migrant children and urban children.

Because family ties in Chinese society remain very strong, there are good reasons to expect that concerns about the welfare of left-behind family members may affect migration (and return) decisions. Accounting for the social cost motive of leaving behind children in determining the length of rural-urban migration in China is important not only from an

[6] The Chinese-language literature is more voluminous on these issues than the English-language literature. For additional references in Chinese, see Chen *et al.* (2009) and Gao *et al.* (2010).

academic perspective but also in terms of policy implications. The growing tension over "migrant labour shortage" that has recently appeared in China's coastal cities, where booming small and private enterprises have absorbed a large quantity of migrants from western China, is illustrative of the importance of family factors in migration decisions. For example, anecdotal evidence from interviews conducted by the *Guangzhou Daily* in February 2011[7] indicated that left-behind children were a major reason for migrants not to return to cities after the Lunar New Year holiday. Moreover, as mentioned above, the *hukou* system is considered an important cause of the transient nature of migration. Evaluating the role of children in individual's decisions regarding migration duration can thus help further understanding the multidimensional impact of the *hukou* system on migration.

The overall goal of this paper is to explore the role of children as a motive for return migration in China. We first present a simple illustrative model of migration duration (or intentions to return) based on Dustmann (2003) that accounts for left-behind children through parents' altruistic behaviour. The discussion also points to the potential differentiated impact of children on return decisions depending on their age and gender. Then, using a unique dataset collected in 2008, we provide an empirical test based on two complementary approaches. We first use a duration model to estimate the determinants of the length of migration for both on-going migrants with incomplete migration spells and return migrants with complete migration spells. Second, we apply a binary Probit model to study the return intentions of on-going migrants. Both models find consistent results regarding the role of left-behind children as a significant motive for return.

[7] http://media.workercn.cn/c/2011/04/06/110406103941721910878.html (in Chinese).

Our paper contributes to the existing literature in at least two main ways. First, although children may be important stakeholders in the migration phenomenon, little attention has been given to children in the analysis of migration decisions in the international migration literature. A few exceptions are Djajic (2008) and Dustmann (2003). In the Chinese context, the dearth of data is an important limit to the study of the interaction between left-behind children and migration duration. To our knowledge, Connelly *et al.* (2012) is the only work that thoroughly studies the role of children in the migration decisions of Chinese women using data collected in the early 2000s. Complementary to their study, we propose an updated and more comprehensive evaluation of how left-behind children affect the return decision. In particular, we use a recent database that covers a period during which both rural-urban migration and a counter-flow of population back to the countryside increased dramatically, which may enable us to better capture recent changes associated with return migration in China. Based on these data, our analysis also adds to the work of Connelly *et al.* (2012) by examining the whole migrant population (rather than only women at the age of childbearing) and by analysing both complete and incomplete episodes of migration for the entire individual migration history as well as return intentions for on-going migrants.

Second, by examining the determinants of the length of migration, this paper also contributes to filling the lack of research on migration duration in China. Although the length of migration is an important indicator of the flow and scale of migration as well as the economic effects on both receiving and sending regions, it has received rather limited attention in the migration literature, including for international migration[8]. For China, the

[8] One may yet refer to Carrión-Flores (2006), Djajic (2008), Dustmann and Kirchkamp (2002), Dustmann (2003), Kirdar (2010), Lindstrom (1996), Schroll (2009) and Stark *et al.* (1997).

issue has strong political importance because there is a fear that the inability of cities to adequately absorb these migrants may eventually lead to social unrest. However, this issue needs to be better understood.

The paper proceeds as follows. Section 2 describes the study area and provides descriptive statistics on migration duration and intentions to return. Section 3 presents a simple illustrative model. The empirical methodology is described in Section 4, and the main results are presented in the following two sections. Section 5 examines the determinants of migration duration with a duration model. Section 6 investigates the determinants of return intentions with a Probit model. Section 7 concludes.

2. Study area and data description

The data used in this paper come from a series of rural household interviews conducted in Wuwei county, Anhui province, from September to November 2008. Wuwei county was selected because of its relatively long labour force export history, the county being famous for sending out female domestic service workers since the beginning of the 1980s. According to local official statistics, at the end of 2006 individuals working outside the county accounted for 43 percent of the entire county's rural labour force (Wuwei County Government, 2007). Together with the large-scale migration, the county is also characterised by a sizable number of left-behind children[9]. Recent data show that in the district of Wuhu, to which Wuwei

[9] Wuwei county is not a special case within the province. In Connelly *et al.* (2012), among respondents of a survey of rural women of childbearing age from Anhui and Sichuan provinces collected in the fall of 2000, only 12% took their child with them during their last migration episode. Clearly, a large number of children are being raised in rural areas by grandparents and relatives while their parents work in cities. An investigation conducted by the County Women's Federation in Hedian town (one of the 23 towns of the county) showed that 65% of the

county belongs, 83,400 of the total 332,000 compulsory education students are left-behind children, accounting for 25% of the entire student population[10]. In another county of the province, Lujiang county, a comprehensive survey conducted in 2005 and 2006 for 12 middle schools in 9 towns showed that up to 60% of the student population were left-behind children with one or both parents being migrants the year before the survey (Xu *et al.*, 2007).

Four towns were chosen for the survey: Gaogou, Liudu, Dougou and Tanggou. Three administrative villages in each town and twenty households on average in each village were randomly selected. A total of 239 households were interviewed, providing information on 969 individuals. Individual information includes personal characteristics, actual working position and income. For those having a migration and/or return migration history, their working experience during and after migration was also recorded. A separate administrative village survey was also conducted in each village to collect information about the general economic, geographic and demographic conditions at the locality.

The sample used in this paper is composed of 284 individuals having a migration and/or return migration history, with 125 return migrants and 159 on-going migrants. Return migrants are individuals who are currently residing and working in the county, with at least 6 months migration work experience outside the county. Circular migrants are counted as on-going migrants. This primary dataset is unique in that it contains detailed information both on the complete length of migration for each return migrant and the incomplete length of migration for on-going migrants. For return migrants, the length of migration duration is

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students at school in the town are left-behind children. Among them, 77% have both parents away. In 43% of the cases, grand-parents are taking care of the left-behind child, and in the other 57%, relatives or friends are taking care of the left-behind child. The frequency of the parents' visits are once a year for 58% of the cases, once every two years for 27% and less than once every two years for 15%.

[10] http://ah.anhuinews.com/system/2012/03/02/004806735.shtml (In Chinese).

defined as the total cumulated number of years of migration from the year of an individual's first migration up to the year of her last return. For on-going migrants, the length of migration duration is the total cumulated number of years of migration from the year of an individual's first migration until the year of the survey.

In addition, the survey provides information about return intentions for on-going migrants. Respondents were asked whether on-going individual migrants wish to remain permanently in the destination area or whether they wish to return home at some point in the future. If on-going migrants were absent from home at the time of the survey, answers were given by family members (e.g., household head or spouse), who also answered other questions in the questionnaire[11]. Of the 159 on-going migrants, we obtained clear information on their return intentions for 117 individuals, and we construct a dummy variable that equals one for those declaring an intention to return soon or in the future and 0 for those declaring no intention to return[12].

Information gathered during the survey provides hints on the importance of the left-behind children phenomenon in the area and on its possible relation with return decisions. Most school-age children (76.4%) are found to be living in the local town or village, and only 2.5% are living with their migrant parents in cities. A small portion (16%) are living alone in other places outside the county: this is mostly the case for students of above high school level

[11] This is a clear limitation of the data, as indirect answers provided by other household members may not reflect the true intention of the migrant. However, we asked two additional questions related to the specific reasons for return intentions: "*If you want to come back home, what is the main reason?*" and "*If you do not have any plan to return at present or in the future, what is the main reason?*". Because these questions are logically linked to each other, we believe that answers on the return intentions are likely to have been made by the respondents under relatively serious consideration. That said, we cannot rule out the possibility that in these cases, the answers reflect the wish of the left-behind who responds rather than the true intention of the migrant.

[12] The 42 out-migrants for whom we do not have a clear intention either to return or to settle in cities are kept in the sample used in the migration duration analysis but are excluded from the sample used in the return intention analysis.

who pursue studies in other regions. Although our data did not directly record the situation for pre-school children (under the age of 6), pre-school children are facing a similar situation of separation from their parents. The survey collected information on the reasons for return migration, with multiple answers allowed. Of all the reasons provided, 25% were related to children, either to "look after children" or "for children's education" [13].

Table 1 reports summary statistics of migration spells. The mean length of migration for the overall sample is 6.74 years, and 31% of migrants have experienced more than 8 years of migration[14]. The mean lengths of stay for both on-going and return migrants are fairly close, though slightly longer for the former (6.88 years vs. 6.57 years). The pairwise correlation of the length of migration with the year of migration is negative and significant for both return migrants and on-going migrants: earlier migrants are more likely to have a longer migration duration than more recent migrants[15].

Table 2 presents descriptive statistics for the overall sample as well as for return migrants, out-migrants who intend to return and out-migrants with no intention to return. The average age of migrants (return and on-going) is 34 years and the average education level is 6.8 years. 42% are female and 72% are married with an average migrant household size of 4.7. In terms of family composition[16], half the migrants have children under the age of 16, 35% have at least a son, 28.5% have at least a daughter and 27.5% have pre-school children (under the age of 6). The average number of children under the age of 16 per migrant is 0.73, with 0.39 sons

[13] In some instances, parents even reported returning "for the sake of children's education because of the *hukou*".

[14] This average duration of migration is consistent with the findings of larger urban-based migrant surveys, including the 2007 RUMiCI survey, which reports an average duration of 7 to 8 years for on-going migrants. See Gong *et al.* (2008) for a comparison of all survey data available for China.

[15] The correlation coefficients are -0.65 for the whole population, -0.95 for out-migrants, and -0.52 for return migrants. All the correlations are statistically significant at 1 percent.

[16] All children-related variables are computed at the moment of return for return migrants and at the time of the survey (2008) for out-migrants.

and 0.35 daughters. Interestingly, in regard to pre-school children (0.31 per migrant), the gender composition is more equal, with 0.16 sons and 0.15 daughters. In terms of migration characteristics, 52% of migrants have a migrant spouse (either return or on-going).

The sub-sample of return migrants is significantly much older, less educated and more likely to be married than the out-migrant population[17]. Family characteristics indicate that return migrants have a household size significantly smaller than out-migrants. They also have fewer pre-school children, children at school, and, in particular, male children at school at the moment of return than out-migrants at the time of the survey. In terms of migration characteristics, return migrants have a high rate of spouses being either migrants or return migrants. Interestingly, for their first migration, return migrants migrated on average at an older age than out-migrants (26 years *versus* 22 years).

The comparison of the sub-sample of out-migrants who intend to return with out-migrants who have no intention to return also highlights a number of significant differences. In terms of individual characteristics, out-migrants who intend to return are much older, more likely to be married and less educated than out-migrants with no intention to return. Concerning their household characteristics, 68% of out-migrants who intend to return have at least one child compared with 46% of out-migrants with no intention to return. They also have more boys (53% vs. 33%). Differences are more pronounced for both children and male children at school because 47% (41%) of out-migrants who intend to return have a child (a son) at school (compared with 24% and 17% for out-migrants with no intention to return). Finally, they tend to have more pre-school daughters as well (29% have a pre-school daughter

[17] The comparison between return migrants and out-migrants (whatever their intention in terms of return) is based on mean tests not reported here.

compared with 12% for out-migrants with no intention to return).

3. An illustrative model of return decisions with left-behind children

Return migration can be considered part of a lifetime utility maximisation plan with given budget (and liquidity) constraints (Borjas and Bratsberg, 1996). In the existing literature, the return motives notably include location preferences with a higher marginal utility of consumption in the area of origin (Djajic and Milbourne, 1988), a higher purchasing power of the destination area currency at home (Djajic, 1989; Stark *et al*., 1997) and higher returns to human capital accumulated in the destination area at home (Dustmann, 2001; Dustmann *et al.*, 2011). However, as highlighted by Dustmann (2003) and Djajic (2008), the decision to return and the optimal time of return can also be influenced by altruistic motives of parents towards their offspring in the household. Hence, the migration behaviour, and the decision to return, may be driven not only by individual life-cycle considerations but also by dynastic motives such as offspring's welfare in the future[18]. Emphasising the family unit rather than the individual migrant makes sense in rural China, where family ties are strong and may be important components in explaining individual decisions. Moreover, with migration patterns shaped by the household registration system (*hukou*), which does not entitle rural migrants to urban benefits and leaves most children behind, such an approach seems the most relevant. In their study of a sample of migrants living in Beijing, Fan et *al.* (2011) argue that the desire to be near left-behind children is an important reason for a migrant's desire to return.

[18] Considering the household, rather than the individual, as the most appropriate decision-making unit in return migration is consistent with the "New Economics of Labor Migration" (NELM) literature, which explicitly integrates migration decisions into a household strategy (Taylor, 1999).

The simple model presented below is meant to be illustrative of the conjectured influence of left-behind children on return migration. It builds on Dustmann (2003) and includes a number of alterations to account for specific Chinese features. First, we assume that the parent migrates alone and leaves behind her child. Second, because we are interested in school-aged or pre-school children in the home village, we also assume that the child does not work in the second period. Given these two assumptions, the proposed model captures the situation of a family unit composed of a worker engaged in migration (the parent migrant) and a left-behind child.

We consider two periods. In period 1, the parent works and lives in a city, while her child lives in the countryside and is subsidised by the parent. In period 2, the parent may decide to return to or stay in the city. The parent decides her own and her child's consumption in periods 1 and 2. Because the child is not assumed to work in period 2, the altruism of the parent takes place through income transfer to the child in period 1 and through daily care (in case of return) or income transfer (in case of settlement in city) in period 2. As in Dustmann (2003), the return decision is taken by simply comparing lifetime welfare in the two locations.

The utility functions of the parent are supposed to take the usual logarithmic form. Period 1's utility function U^1 is given by:

$$U^1(c^1, k^1) = \ln(c^1) + \gamma \ln(k^1), \qquad (1)$$

where c^1 is the consumption of the migrant parent, k^1 is the consumption of the left-behind child and the parameter $\gamma>0$ is the altruism weight.

Period 2's utility function U^{2j} depends on the location choice of the migrant, whether settled in the city ($j=M$) or returned home ($j=R$), and is given by:

$$U^{2j}(c^{2j}, k^{2j}) = \ln(c^{2j} a^{j}) + \gamma \ln(k^{2j} b^{j}), \quad (2)$$

where a^j and b^j are preference parameters. In particular, $a^R > a^M$ and $b^R > b^M$ reflect a location preference of the migrant for her home village in terms of both her own consumption (a) and her offspring's consumption (b).

Under the simplifying assumption of no discounting, the total utility function U of the parent can be simply expressed as follows:

$$U = \ln(c^1) + \gamma \ln(k^1) + (1-h)[\ln(c^{2M} a^M) + \gamma \ln(k^{2M} b^M)] + h[\ln(c^{2R} a^R) + \gamma \ln(k^{2R} b^R)], \quad (3)$$

where the parameter h stands for the return decision. At h=1, the migrant decides to return; at h=0, she settles in the city.

The budget constraint of the parent equalises intertemporal income and consumption:

$$c^1 + (1-h)c^{2M} + hc^{2R} + k^1 + (1-h)k^{2M} + hk^{2R} = y^1 + (1-h)y^{2M} + hy^{2R}, \quad (4)$$

where y^1, y^{2M} and y^{2R} are the income of the parent in period 1, period 2 in the city and period 2 at home, respectively.

The return decision of the migrant is given by the maximisation of her utility U with respect to her own consumption in periods 1 and 2 as well as to her left-behind child's consumption in periods 1 and 2 under the budget constraint expressed above for two scenarios: settling in the city (h=0) or returning to the countryside (h=1). The intertemporal utility maximisation leads to the following results. The migrant parent will choose to return if:

$$2(1+\gamma)\ln\left(\frac{y^1 + y^{2R}}{y^1 + y^{2M}}\right) + \ln\left(\frac{a^R}{a^M}\right) + \gamma \ln\left(\frac{b^R}{b^M}\right) > 0. \quad (5)$$

As in Dustmann (2003), the first term illustrates the income impact of return on total utility: as earnings can be assumed to be lower at home ($y^{2R} < y^{2M}$), the decision to return will entail a loss in utility. The loss in utility is higher for altruistic parents (γ>0) because their

reduced earnings also affect the child's outcomes. This may be the case, for instance, if the reduced earnings contribute to reduce opportunities for education or health care. This first term captures the "educational prospect" dimension as described below. Moreover, if the migrant has no location preference ($a^R = a^M$ and $b^R = b^M$), her altruistic behaviour would reinforce the standard income effect towards a decision not to return. The second term shows the influence of the relative location preference of the migrant in terms of her own consumption. If $a^R > a^M$, her relative preference for her home village may partly compensate the income effect and logically reduce migration duration. The third term reflects the parent's perception of the well-being of the left-behind child. If the child is perceived as suffering from parental absence in her daily life, then $b^R > b^M$ will give incentive to the parent to return. In the vein of Dustmann (2003), this model illustrates the trade-off migrant parents face when deciding to stay or to return: the consumption of the child is multidimensional in that it incorporates daily care and educational prospects that may be somewhat conflicting in terms of the decision to return. Assuming no migrant parent location preference in her own consumption ($a^R = a^M$), the decision to return for an altruistic parent simply reduces to a comparison of the loss in utility due to lower income (and, possibly, a reduction in education opportunities) with the gain in utility thanks to a better-off child (through better daily care, for instance).

The two dimensions, daily care *versus* educational prospects, are quite intuitively related to the age of the child: one may expect that daily care will be valued for young children, while educational prospects will be more important if the child is of school-age. Moreover, in a

society with a strong tradition of preference for sons[19], one may further expect that the return-decision outcome is also going to be linked to the gender of the child, although the total children effect may remain ambiguous.

In summary, the return decision (h) of a migrant will depend on the expected income gap between the city and the hometown, the migrant's preferences and altruism, and her children's characteristics (notably gender and age). The empirical analysis presented below aims to estimate this reduced-form relationship by focusing successively on the migrants' length of stay in cities and their reported intention to return.

4. Empirical approaches

As indicated above, two main approaches are used to investigate how left-behind children influence return migration in China. First, because our dataset contains a sample including both on-going out-migrants and return migrants, we analyse complete and incomplete length of migration using a duration model. The second approach focuses on on-going out-migrants only, for whom declared intentions to remain in cities or to return have been collected. The two approaches are presented below.

Framework for duration analysis

Migration duration data are right-censored by definition because the date of transition out the state (i.e., returning home) is unknown for on-going migrants. As highlighted by

[19] See, e.g., Lee (2008) for a review of the long history of pro-son bias in China.

Jenkins (2008), survival (or duration) analysis offers a number of advantages compared with OLS or binary choice models for such data. In particular, it is well suited to account for the timing of migration events (including return migration), for censoring in the data and for incorporating time-varying variables in the estimation.

Because answers about migration duration were given in months, discrete time periods for migration duration are defined in months[20]. Consequently, we use a discrete-time (grouped data) version of the commonly used proportional hazard (PH) model[21] developed by Prentice and Gloeckler (1978). Let T_i be the discrete random variable representing the uncensored time at which the end of migration occurs. Then, for individual *i* who stayed in the city for at least *t* months, the discrete-time hazard rate $\lambda_i(t, X)$ conditional on covariates can be defined as follows:

$$\lambda_i(t, X) = \Pr[T_i = t / T_i \geq t, X_{it}] \tag{6}$$

This equation gives the conditional probability of individual *i*'s migration ending at time *t*, given that it has not ended yet. We consider a complementary log-log specification for the hazard function, which gives:

$$\lambda_i(t, X) = 1 - \exp\left[-\exp(\beta' X_i(t) + \gamma(t))\right] \tag{7}$$

As shown by Prentice and Gloeckler (1978), this model is a discrete-time analogue to the continuous-time Cox proportional hazard model. $\gamma(t)$, which depends on *t* alone, is a transformation of the baseline hazard common to all individuals. We assume a duration

[20] When the duration time is discrete, the estimation function is slightly different. A detailed description can be found in Jenkins (2008).

[21] The general idea of a proportional hazard model is that the effect of an independent variable is seen as having a constant proportional effect on the baseline hazard. The adoption of such model is usually grounded on two important specifications: the distributional assumptions regarding the baseline hazard and the assumption of unobserved heterogeneity (Bhat, 1996).

dependence pattern analogous to that in the continuous-time Weibull model[22] by entering the log of *t* as a covariate. $\exp(\beta' X_i(t))$ is a person-specific non-negative function of covariate *X*, which scales the baseline hazard function common to all persons.

An important issue in duration models is unobserved heterogeneity. Ignoring unobserved heterogeneity that arises when unobserved factors influence duration can lead to a severe bias in the estimates of the covariate effects (Lancaster, 1990). Consequently, one could obtain an underestimate of the true proportionate response of the hazard if the unobserved heterogeneity is not captured because of potential omitted variables or measurement errors (Jenkins, 2008). We account for unobserved heterogeneity by incorporating a Gamma distributed random variable with unit mean and finite variance, as suggested by Meyer (1990).

The covariates that enter the vector *X* include individual characteristics, such as age[23], gender, education and marriage, and individual migration experience measured by an occupational dummy variable that equals one if the subject is a wage-worker and zero if the subject is self-employed during the last job in the city (current job for on-going migrants). Destination and hometown characteristics are also measured, respectively, by the size of the destination city and the logarithm of the town's average rural per capita annual net income between 2004 and 2008. We also control for household characteristics that may influence the decision to return. Three variables are considered: the household size, the number of elderly and the migration status of the spouse. As briefly mentioned above, in Chinese society grandparents play an important role in their grandchildren's care. Fan et *al.* (2011)'s study finds that migrants with fewer parents in the home village are more likely to bring their

[22] The most commonly used form in continuous-time duration studies is a parametric hazard (Bhar, 1996) with an assumed Weibull form baseline (Meyer, 1990).
[23] The age variable is recomputed to reflect the age at the moment of migration.

children to Beijing, and they argue that migrants might have chosen to leave behind their children if there were sufficient support from their grandparents in their home village. On the other hand, elders also count as dependents who need to be taken care of. As a tradition in Chinese society, supporting old parents is an important responsibility for children when they grow up. If this is the case, then having elderly at home may also be an obstacle for children to choose to work far away. Therefore, having elderly at home may be an important factor in influencing return behaviour, although the direction of the impact may be ambiguous. Likewise, the impact of the spouse's migration status may be multi-faceted. On the one hand, reunification intention could drive a migrant member to come home earlier if his/her spouse is left behind; on the other hand, having a spouse at home taking care of the family could also free the family constraint for the migrant member and therefore delay the return.

Finally, to assess how the presence of children by age and by gender affects the parent's length of stay and return decision, we use a set of children-related variables for each individual at the time of return measured either by the number of children or by dummy variables. We distinguish children from different age-groups (children below the age of 16, children between 6 and 12, and pre-school children) and by gender (for each age-group).

Framework for return intention

As explained in section 2, the household survey provides additional information for on-going migrants, which complements the duration analysis by providing information about their intention to return. The variable of interest is a binary one: it equals one if out-migrants declared their intention to return and zero if they declared their intention to stay in cities.

Because we exclude answers to the question on return intentions that were not strictly 'yes' or 'no', we are left with 117 individuals currently working outside Wuwei county.

The probability p_i of migrant i intending to return is estimated using a binary probit model:

$$p_i = F(\alpha + \beta X_i) \tag{8}$$

where F is the standard normal cumulative distribution function. In a way similar to the duration analysis, the vector X includes a series of variables representing children-related factors, individual characteristics, household characteristics, current occupation at the destination and source region characteristics.

Endogeneity concerns

One difficulty in investigating the role of children in the return migration decision is that there are potential identification concerns. First, migration plans and fertility may be simultaneous decisions. Second, unobserved factors that are related to fertility may simultaneously affect return plans. Unfortunately, our cross-section database does not allow us to adequately address the potential endogeneity bias from a statistical point of view. However, we argue that in the case of China, there are good reasons to believe that the implied bias should not be too strong because the fertility decision is not fully private and free as it is in other countries. That said, we also acknowledge that we cannot fully rule out potential identification issues and that the implied biases should be kept in mind when interpreting the coefficients.

China provides an interesting case regarding fertility that is both controlled and low. The

one-child policy introduced in 1979 to control population growth, which was deemed to be a serious threat to economic development, resulted in a significant change in the family structure through its strong impact on the timing of first birth and on the likelihood of higher-order births. Restrictions on family size and on the timing of marriage and child bearing that were imposed under the policy led to a sharp decrease in the total fertility rate from 2.8 in 1979 to 1.8 in 2001 (Festini and de Martino, 2004). As documented in McElroy and Yang (2000), although the policy is more liberal in rural than urban areas, a second child, at most, can be approved by local authorities while a third child remains prohibited (for Han people).

The local enforcement of the one-child policy in Wuwei county can be seen from data on the number of children per household. In our sample (including both migrant and non-migrant households), the average size of the household is 4.07. On average, households have 0.64 children below the age of 16; 50.63% have no child below 16; 35.15% have 1 child; 13.39% have 2 children; and 0.84% have 3 children. The proportions are similar when the sample is restricted to women aged between 20 and 50. Moreover, a comparison between non-migrants and migrants (either returned or on-going) does not reveal any significant difference in the number of children between the two groups, which indicates no strong relationship between migration and fertility behaviour, at least in the area under study.

In addition to the low level of fertility, another feature worth emphasising here is that the one-child policy entails controls that make the fertility decision not free at the individual/family level, even for the timing of the first birth. Michelson (2010)'s description provides a clear overview of the control put on fertility in rural areas: "The performance of

local cadres is evaluated to an important measure by their success in meeting birth targets. To keep local fertility levels within these fixed targets, couples wishing to have a child are required to apply for a birth permit. Birth permits are issued only to applicants who satisfy policy conditions—if the local birth quota for the year has not been reached. In other words, every birth is supposed to be authorized, or on the plan." (p. 192). Local family planning authorities are responsible for the enforcement of the policy in the form of punishments and fines for couples who do not comply with the family planning. Evidence has also been reported of more draconian measures being employed, such as forced abortion or sterilisation by the local family planning authorities (Hardee-Cleaveland and Banister, 1988).

5. Migrants' length of stay in cities: a duration analysis

Before presenting the estimation of the duration models, Figure 1 depicts non-parametric Kaplan-Meier estimates of the survival function. It clearly highlights negative duration dependence: the probability that migration ends shortly increases with the length of migration. The hazards are high at the beginning of a spell and then decline monotonically. The median survival rate (i.e., stay in cities) is approximately 132 to 144 months (11-12 years). When the migration spell reaches more than 252 months (i.e., approximately 21 years), the overall survival rate finally stabilises at a low level of approximately 12%[24], suggesting that 12% of the migrant population tends to settle permanently in cities.

Tables 3 and 4 report estimation results for the discrete-time proportional hazard model

[24] However, one should note that for this long duration, the 95% confidence interval gives a range between 5% and 23%. This might be related to the fact that we do not have many individuals with such a long migration history.

with various sets of covariates. Table 3 uses children-related dummy variables, whereas Table 4 uses the number of children in the estimation. Models 1, 2, 5 and 6 introduce a set of control variables related to children under the age of 16 and by various age groups (pre-school children *versus* children at elementary or secondary school). Models 3, 4, 7 and 8 further distinguish the gender of children.

As explained in the methodological section, it is very plausible that there are unobserved individual characteristics, such as motivation or ability, that affect the length of the migration spell. We thus estimated two different models: a cloglog model that does not take into account any unobserved individual heterogeneity and a cloglog model that assumes a Gamma distribution for an included individual heterogeneity term. The LR test of the model with *versus* without unobserved heterogeneity reported at the bottom of each table shows that the null hypothesis that the variance of the unobserved heterogeneity parameter is equal to zero is always rejected. The model with Gamma-unobserved heterogeneity thus seems to fit the data best and is reported in Tables 3 and 4. Still, one can note that the corresponding estimations without controlling for unobserved heterogeneity presented in Tables A1 and A2 in the Appendix show fairly robust results. In all the models, the coefficients and their level of significance are broadly similar. The coefficients are slightly larger in absolute value when controlling for unobserved heterogeneity, which is consistent with the fact that failing to account for unobserved individual heterogeneity underestimates the extent to which the hazard rate increases with duration and the magnitude of the impact of the covariates on the hazard rate (Lancaster, 1990).

Looking at children-related variables, the various models presented in Tables 3 and 4

highlight a number of interesting patterns. Models 1 and 5 show that the estimated coefficients for both the dummy of having children under 16 and the number of children under 16 at the time of return are negative and significant. According to Table 3, at each survival time, migrants with a child have a 54% lower probability of returning than migrants who have no children[25]. Hence, individuals who have more children at the moment of return exhibit longer migration spells. Models 2 and 6 distinguish children of different age groups by estimating the separate impact of children at school and of pre-school children. The results show that the negative impact found in Models 1 and 5 is attributable to children at school (whose effect is negative and significant), whereas the effect of pre-school children is negligible. Models 3, 4, 7 and 8 further distinguish children at school and pre-school children by gender. Interestingly, we find that the gender of the offspring matters: while having daughter(s) at school and pre-school daughter(s) has no effect on migrant parents' return decision, sons of school age do have a significant impact. Having son(s) at school at the moment of return negatively affects the return decision of the migrant parents: at each survival time, having a son at school at the time of return decreases the probability of return by 61%. In contrast, having pre-school son(s) at the moment of return positively (though weakly[26]) affects the return decision.

In summary, the main results regarding the impact of left-behind children on migration duration are the following: *i*) individual migration duration is driven by family motives, with left-behind children being important determinants of the return decision; *ii*) children at school

[25] This is calculated from the exponentiated coefficient (not reported here), which gives the hazard ratios as in a continuous time model.
[26] The effect is only significant in the estimation that does not account for unobserved heterogeneity (see Table A1).

are a motivation for migrants to extend their length of duration, highlighting a motive for migrant parents to accumulate finances for the education prospects of children at school; *iii*) the gender of left-behind children matters for the migration spell, with sons generating a significant impact compared with daughters; and *iv*) pre-school male children seem to be a stronger determinant for those willing to return. These results are consistent with our theoretical prediction that children at different ages matter differently in the decision-making of migrant parents. Younger children tend to draw parents back for their need of daily care, while children at school tend to keep parents in cities for education prospects. The results are also consistent with Connelly *et al.* (2012), who argue that young children require more adult caregiving time and older children require more monetary inputs because of schooling. A final remark is that, in either case, there is evidence of a general gender bias in favour of sons, indicating the prevalence of traditional "son preference" values among rural households in Wuwei county.

In addition to children-related variables, we find consistent and interesting results regarding other explanatory variables in all the models. Unsurprisingly, the baseline hazard increases with elapsed survival time, which means that return probabilities depend positively on the length of migration spells to date. The increasing baseline can be interpreted as an illustration of the temporary nature of the migration phenomenon in China. To further illustrate this point, Figure 2 displays the predicted hazard rate at the mean of covariates based on the estimation of Model 1[27]. It shows that the predicted hazard rate is always increasing all along the migration duration.

[27] The predicted hazard rate is calculated based on the mean level of the predicted hazard rate for each person given the values of her covariates and the spell month value (Jenkins, 2008).

Economic conditions in the source region are found to have a positive and significant impact on the hazard rate: the elasticity of the hazard rate with respect to the town average rural per capita annual net income between 2004 and 2008 ranges from 1.41 to 1.50 (see Table 3). This finding indicates that favourable economic conditions contribute to attracting migrants back home. Hence, the migration duration is longer for migrants from poorer regions than for migrants from wealthier emigration regions. This finding is consistent with the international migration duration literature, particularly with the empirical findings of Schroll (2009) in the case of Denmark.

Turning to individual characteristics, we find a positive impact of age on the hazard of return. People who migrated at an older age are more likely to have higher hazard rates of return. Gender also influences the length of migration, with female migrants being significantly more likely to have shorter lengths of stay than male migrants. Compared with single individuals, married individuals are also more likely to return quickly. In terms of household characteristics, a migrant from a larger family is more likely to stay longer at a destination, which is consistent with the hypothesis that increasing returns to scale in household chores for households with a larger size and more labour availability make it easier for some members to migrate. Regarding the migration status of the spouse, migrants with a migrant spouse exhibit lower hazard rates and, therefore, longer migration spells: they tend to return less than those who have a non-migrant spouse. This finding is consistent with Connelly *et al.* (2012), who find that for women, having a husband who has migrated increases the length of the last completed migration episode by eight months. Finally, the effect of the number of elderly in the household on the hazard of return is negligible,

indicating that the “supporting the elderly” motive for return and the “elderly caring of grandchildren” motive for staying in cities are certainly both at stake and compensate on average.

6. Intended return of on-going migrants

To complement the analysis of migration duration, this section examines how left-behind children influence the intended return of on-going migrants. As described above, our survey provides information on out-migrants’ intentions to return or to settle in cities. This enables us to empirically examine the determinants of return intentions and to provide a complementary approach to the evaluation of children-related motives to return. As in the migration duration section, we test the impact of children by age and by gender.

Table 5 reports the estimated marginal effects for the probability of intended return. The first column shows the results using a baseline specification with the number of children below the age of 16. The next two columns focus on testing the impact of children by age, and the last four columns introduce differences by gender and the effect of being a mother. Models 1 to 3 all suggest a positive impact of children of different ages on migrants’ intention to return. Each additional child under the age of 16 in the household increases the return probability by 16.5 percentage points. Distinguishing age groups reveals that pre-school children have a strong impact on the intention to return: the presence of pre-school children in the household is associated with an increase in the probability to return by 39.3 percentage points, and an additional pre-school child increases the return probability by 33.5 percentage points. Moreover, Model 2 indicates that the number of school-age children (between 6 and

12) in the household is also associated with a higher probability of return intention, although the impact seems smaller compared with pre-school children. These results confirm the pulling effect of children, and they highlight the seemingly stronger force of pre-school children in attracting on-going migrants back to their rural hometown. The results are consistent with the duration analysis findings, suggesting that the daily care motivation may dominate in attracting migrants back when children are young, while the education prospect consideration becomes more important in delaying migrants' return when the child reaches schooling age. In the next two columns of Table 5, we introduce a further distinction by gender. Both the number of school-age sons and the number of school-age daughters have a positive coefficient, although they are not robust to alternative specifications (see Model 6). For pre-school children, both coefficients are positive and significant, and the presence of pre-school daughters seems to be more influential than pre-school sons in influencing the return decision.

The last two columns of Table 5 separately estimate the effect of being a mother of children at school and that of being a mother of pre-school children on the return decision. One may expect that the pulling force of children matters differently in the pattern of return migration depending on the gender of the migrant, as men and women traditionally assume different responsibilities in the rural family, with women being expected to take care of children at home (Jacka, 2012). The empirical literature on return migration in China indicates a stronger propensity to return for women, especially for married women (Luo, 2006; Fan et *al.*, 2011). Models 6 and 7 confirm the expected difference: mothers are more likely to intend to return, particularly when they have pre-school children (Model 7). Being the mother of

pre-school children increases the probability to return by 65.7 percentage points.

In light of the prediction of our model, the results by age-group and by gender bring an additional interesting perspective on the trade-off migrant parents face regarding the education prospects of their offspring. On the one hand, because compulsory education is free for children living in their official place of registration (i.e., in rural areas for migrant children), an altruistic parent may have an incentive to leave her child behind and possibly return if daily parental care is believed to be important. On the other hand, for higher education, an altruistic parent may be willing to stay in the city to be able to pay the education fees of her child. Because we focus here on school-age children aged 6 to 12, our findings may capture the first dimension. Moreover, our results by gender indicate that migrant parents may value differently the importance of daily care for boys and girls. On the one hand, they may worry more about the potentially adverse effects the lack of parental care has on the education outcomes of their son(s) rather than their daughter(s) (either because they put more weight on the educational achievement of a son or because they consider that sons require higher monitoring in their studies). On the other hand, they may worry more about the impact of parental absenteeism on young (pre-school) daughters. It is worth emphasising here that for pre-school children, the key issue is health rather than education. As summarised by Lee (2008), empirical studies on gender inequality in China have found the gender bias to be stronger in health care expenditures and in the intake of nutrients than in education. To reduce the potentially negative impact of her absence on her pre-school daughter's health status, an altruistic parent may have a stronger incentive to return.

Regarding other covariates, the estimates of the Probit models are broadly consistent

with the predictions of the duration model. First, the household size has a negative impact on individual's return intention, suggesting that migrants from larger families are more likely to settle in cities than return to home villages (where they are less needed). Second, individuals from richer regions are more likely to return, suggesting that a favourable economic environment in sending regions tends to draw out-migrants back. In terms of individual characteristics, less educated migrants have a higher probability of expressing an intention to return. This finding may imply a "brain drain" of less developed rural labour-exporting regions, the most educated migrants being those willing to settle in cities. Finally, regarding the current occupation in cities, wage workers are found to be less likely to return compared with the self-employed.

7. Conclusion

This paper examines the role of left-behind children as a motive for return migration in China. A simple model based on Dustmann (2003) is proposed to account for left-behind children through altruistic parents' concerns about the prospects of their offspring and to discuss the potential differentiated impact by age and gender. We then propose two complementary empirical tests based on an original dataset from a rural household survey carried out in Wuwei county (Anhui province, China) in fall 2008. We first use a discrete-time proportional hazard model to estimate the determinants of migration duration for both on-going migrants with incomplete length of duration and return migrants with complete length of duration. We then examine the return intentions of on-going migrants and

specifically estimate the impact of children-related factors by considering both age and gender differences.

The migration duration and return intention studies provide complementary results regarding the role of left-behind children. The duration analysis shows that having children of school-age is a motivation for migrants to extend their length of stay in the city, a result we interpret as illustrating the need for migrant parents to accumulate money for their offspring's education. The analysis of on-going migrants' return intentions confirms the role left-behind children play in explaining return intentions, with a stronger effect of pre-school children on drawing their parents back home. These results illustrate the trade-off that migrants may face when deciding on the length of their stay, which will depend on the different needs of left-behind children of different ages, daily care for young children and financial resources for the education of school-age children. Regarding gender differences, our findings confirm a pro-son bias because, compared with daughters, having a son seems more influential in migrants' decision to return.

The proposed analysis contributes to the understanding of migration dynamics within China by exploring the determinants of the spell of rural-to-urban migration and of the return decision and by taking into account the cost of leaving behind children. While important interregional economic disparities in China drive the massive rural exodus, our analysis suggests that children-related factors contribute to the counter-flow of urban-to-rural return migration. These findings have timely implications regarding the "migrant labour shortage" that coastal regions are facing. By emphasising the importance of family demand factors in return migration, they highlight the multidimensional nature of migration. The simple

"success" (NELM) or "failure" (Lewis, 1956; Todaro, 1969) dichotomy and the "double selection" theory (Borjas and Bratsberg, 1996) on return migration may not properly capture all the dimensions at stake in out-migration and return migration. In the case of China, where particular institutions impose strong constraints on individual or family choice, our findings point to the importance of accounting for both economic and non-economic determinants of migration duration to analyse the dynamics of migration. Thus, they contribute to the literature on migration by stressing the importance of using a family unit framework in modelling return migration decision mechanisms. As Djajic (2008, p. 483) argues, "*one of the shortcomings of the existing literature is that, in explaining decisions related to return migration, it focuses primarily on the individual migrant, rather than on the family unit*".

Moreover, because internal migration is the main engine of urbanisation in China (Wang and Cai, 2009), understanding the factors that explain variations in migration duration is important for designing optimal migration and urban development policies. As discussed in the introduction, one of the key issues regarding migration duration in China lies in the prevailing "involuntary" separation of migrants and their left-behind children as a social consequence of the restrictions imposed by the *hukou* system and education policies. Children undoubtedly need physical and mental care from their parents. Therefore, a direct implication of our findings is that including migrant children in the local urban education system and allowing them to take higher education entrance exams in the places where they have attended schools would certainly contribute to opening choices for migrants to migrate and settle in cities. This would not necessarily entail a full reform of the *hukou* system but rather access to public services no longer being tied to the place of household registration.

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Table 1 - Migration spells statistics

	Average migration spell	0-1 year	1-3 years	3-5 years	5-8 years	>8 years
				Percentage		
On-going migrants	6.88	13%	20%	19%	18%	31%
	(5.59)					
Return migrants	6.57	15%	26%	15%	12%	32%
	(5.43)					
All	6.74	14%	22%	17%	15%	31%
	(5.51)					
Observations	284	40	63	49	43	89

Source: Wuwei 2008 Survey

Notes: Standard deviation in parenthesis.

Table 2 - Descriptive statistics

Mean value or %	Return migrants	Out-migrants with intention to return	Out-migrants with no intention to return	Full sample
Age (years)	40.20	34.29	28.33	34.29
Age at first migration (years)	26.37	23.88	22.10	24.08
Female (=1)	0.416	0.353	0.446	0.415
Married (=1)	0.888	0.824	0.506	0.722
Education (years)	5.888	6.382	7.566	6.754
Household size	4.256	5.147	5.145	4.676
Migrant spouse (=1)	0.600	0.618	0.410	0.525
Children-related variables				
At least one child (<16) (=1)	0.472	0.676	0.458	0.500
At least a son (<16) (=1)	0.320	0.529	0.325	0.352
At least a daughter (<16) (=1)	0.280	0.353	0.277	0.285
At least one child (6-12) (=1)	0.176	0.471	0.241	0.225
At least a son (6-12) (=1)	0.0800	0.412	0.169	0.148
At least a daughter (6-12) (=1)	0.120	0.206	0.108	0.116
At least one pre-school child (=1)	0.216	0.412	0.277	0.275
At least a pre-school son (=1)	0.120	0.118	0.157	0.137
At least a pre-school daughter (=1)	0.112	0.294	0.120	0.144
# children (<16)	0.656	1.088	0.699	0.732
# sons (<16)	0.328	0.559	0.373	0.387
# daughters (<16)	0.328	0.529	0.325	0.345
# children (6-12)	0.208	0.618	0.277	0.268
# sons (6-12)	0.0800	0.412	0.169	0.148
# daughters (6-12)	0.128	0.206	0.108	0.120
# pre-school children	0.240	0.441	0.313	0.313
# pre-school sons	0.128	0.118	0.169	0.158
# pre-school daughters	0.112	0.324	0.145	0.155
Observations	125	34	83	284

Source: Wuwei 2008 Survey.

Notes: For return migrants, all children-related variables are computed at the moment of return; for out-migrants, all children-related variables are information at the time of the survey.

Table 3 - Hazard model estimates of migration duration

	Model 1	Model 2	Model 3	Model 4
Baseline hazard (log spell month identifier)	0.596***	0.669***	0.615***	0.659***
	(0.006)	(0.002)	(0.005)	(0.003)
Age at first migration (years)	0.0513**	0.0627***	0.0509**	0.0561***
	(0.010)	(0.002)	(0.014)	(0.008)
Female (=1)	1.018***	1.173***	1.090***	1.127***
	(0.001)	(0.000)	(0.000)	(0.000)
Education (years)	0.0407	0.0512	0.0343	0.0397
	(0.354)	(0.270)	(0.444)	(0.383)
Married (=1)	1.403***	1.414***	1.427***	1.481***
	(0.010)	(0.008)	(0.009)	(0.008)
Occupation before return (wage worker=1)	0.0386	0.139	0.00498	0.000142
	(0.899)	(0.657)	(0.987)	(1.000)
Working area before return (big city=1)	0.0112	-0.0375	-0.0352	-0.0343
	(0.965)	(0.888)	(0.891)	(0.897)
Log average rural per capita annual net income (2004-08)	1.501**	1.450**	1.411**	1.442**
	(0.020)	(0.034)	(0.030)	(0.032)
Household size	-0.175**	-0.161	-0.141	-0.186*
	(0.048)	(0.108)	(0.160)	(0.056)
# old persons (>70)	-0.216	-0.267	-0.247	-0.192
	(0.469)	(0.410)	(0.422)	(0.539)
Migration status of spouse (migrant/return migrant=1)	-0.903**	-1.087**	-0.965**	-1.038**
	(0.031)	(0.013)	(0.026)	(0.018)
Having at least one child (<16) at return	-0.774**		-0.582	-0.721*
	(0.013)		(0.129)	(0.074)
Having at least one child (6-12) at return		-0.987***		-0.577
		(0.007)		(0.139)
Having at least one child (<6) at return		-0.154	0.149	
		(0.644)	(0.704)	
Having at least a son (6-12) at return			-0.951**	
			(0.029)	
Having at least a daughter (6-12) at return			-0.210	
			(0.616)	
Having at least a son (<6) at return				0.580
				(0.188)
Having at least a daughter (<6) at return				0.166
				(0.699)
Constant	-20.85***	-21.19***	-20.22***	-20.61***
	(0.000)	(0.000)	(0.000)	(0.000)
Variance of Gamma	0.70	0.87	0.69	0.79
LR test of Variance of Gamma=0 (Chibar2)	2.91	5.22	2.86	3.67
Prob.>=Chibar2	0.04	0.01	0.05	0.03
Number of person-month observations	22986	22986	22986	22986

Log likelihood	-741.3	-740.2	-737.8	-738.3

Source: Wuwei 2008 Survey.

Notes: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The coefficients are estimated using the complementary log-log model with Gamma-distributed unobserved heterogeneity and where the coefficient on the duration dependence variable is the log of time.

Table 4 - Hazard model estimates of migration duration

	Model 5	Model 6	Model 7	Model 8
Baseline hazard (log spell month identifier)	0.616***	0.655***	0.588***	0.654***
	(0.005)	(0.002)	(0.005)	(0.003)
Age at first migration (years)	0.0574***	0.0623***	0.0534***	0.0609***
	(0.004)	(0.001)	(0.009)	(0.003)
Female (=1)	1.070***	1.185***	1.088***	1.168***
	(0.000)	(0.000)	(0.000)	(0.000)
Education (years)	0.0513	0.0510	0.0385	0.0497
	(0.252)	(0.268)	(0.385)	(0.277)
Married (=1)	1.394**	1.376***	1.316**	1.407***
	(0.010)	(0.010)	(0.012)	(0.010)
Occupation before return (wage worker=1)	0.0350	0.100	0.00182	0.0284
	(0.909)	(0.745)	(0.995)	(0.929)
Working area before return (big city=1)	-0.0290	-0.0644	-0.0432	-0.0710
	(0.910)	(0.807)	(0.864)	(0.788)
Log average rural per capita annual net income (2004-08)	1.579**	1.538**	1.468**	1.513**
	(0.016)	(0.024)	(0.022)	(0.026)
Household size	-0.129	-0.139	-0.127	-0.140
	(0.178)	(0.176)	(0.207)	(0.169)
# old persons (>70)	-0.233	-0.277	-0.241	-0.239
	(0.443)	(0.388)	(0.425)	(0.452)
Migration status of spouse (migrant/return migrant=1)	-1.002**	-1.085**	-0.956**	-1.092**
	(0.023)	(0.014)	(0.028)	(0.015)
# children (<16) at return	-0.465**		-0.350	-0.260
	(0.021)		(0.269)	(0.421)
# children (6-12) at return		-0.779***		-0.517
		(0.008)		(0.210)
# children (<6) at return		-0.109	0.162	
		(0.707)	(0.669)	
# sons (6-12) at return			-0.911*	
			(0.055)	
# daughters (6-12) at return			0.0475	
			(0.924)	
# sons (<6) at return				0.285
				(0.518)
# daughters (<6) at return				-0.0696
				(0.879)
Constant	-21.94***	-21.91***	-20.75***	-21.57***
	(0.000)	(0.000)	(0.000)	(0.000)
Variance of Gamma	0.76	0.84	0.64	0.82
LR test of Variance of Gamma=0 (Chibar2)	3.54	4.89	2.44	4.14
Prob.>=Chibar2	0.03	0.01	0.06	0.02
Number of person-month observations	22986	22986	22986	22986

Log likelihood	-741.9	-740.5	-738.7	-739.8

Source: Wuwei 2008 Survey.

Notes: see Table 3.

Table 5 - Probit estimates of out-migrants' return intention (marginal effects)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Years of migration (years)	0.00882	0.0122	0.0116	0.0143	0.0138	0.0150	0.0172*
	(0.376)	(0.174)	(0.203)	(0.140)	(0.128)	(0.148)	(0.076)
Age (years)	-0.0439	-0.0411	-0.0492	-0.0387	-0.0374	-0.0276	-0.0369
	(0.177)	(0.208)	(0.156)	(0.265)	(0.282)	(0.430)	(0.323)
Age square	0.000555	0.000546	0.000655	0.000532	0.000501	0.000388	0.000440
	(0.186)	(0.188)	(0.139)	(0.242)	(0.264)	(0.402)	(0.378)
Female (=1) (d)	-0.0372	-0.00803	-0.0322	-0.0373	-0.0463	-0.155	-0.184*
	(0.693)	(0.933)	(0.736)	(0.687)	(0.623)	(0.156)	(0.077)
Education (years)	-0.0275	-0.0347**	-0.0373**	-0.0373**	-0.0405**	-0.0439**	-0.0556***
	(0.107)	(0.033)	(0.029)	(0.046)	(0.025)	(0.032)	(0.008)
Married (=1) (d)	0.249	0.158	0.130	0.0678	0.0980	0.0101	0.113
	(0.124)	(0.352)	(0.462)	(0.705)	(0.583)	(0.957)	(0.528)
Occupation before return	-0.373**	-0.410**	-0.432**	-0.368*	-0.381**	-0.357*	-0.381*
(wage worker=1)	(0.047)	(0.031)	(0.020)	(0.051)	(0.046)	(0.061)	(0.054)
Log average rural per capita	0.722**	0.877**	0.765**	0.735**	0.711**	0.758**	0.777**
annual net income (2004-08)	(0.034)	(0.012)	(0.019)	(0.024)	(0.026)	(0.021)	(0.012)
Household size	-0.0972***	-0.110***	-0.136***	-0.133***	-0.125***	-0.127***	-0.122***
	(0.008)	(0.006)	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)
Migrant spouse (=1)	-0.0827	-0.0859	-0.0885	-0.0760	-0.0954	-0.101	-0.0891
	(0.503)	(0.480)	(0.460)	(0.512)	(0.422)	(0.373)	(0.449)
# children (<16)	0.165*			-0.263	-0.256	-0.286	-0.302
	(0.063)			(0.236)	(0.240)	(0.174)	(0.171)
At least one child (6-12) (=1)		0.186					
		(0.159)					
At least one pre-school child		0.393***					
(=1)		(0.010)					
# children (6-12)			0.238**		0.471*		0.439*
			(0.046)		(0.064)		(0.077)
# pre-school children			0.335***	0.594**		0.613**	
			(0.009)	(0.024)		(0.017)	
# sons (6-12)				0.592**		0.495	
				(0.047)		(0.135)	
# daughters (6-12)				0.553*		0.508	
				(0.057)		(0.103)	
# pre-school sons					0.497*		0.454*
					(0.066)		(0.089)
# pre-school daughters					0.599**		0.544**
					(0.019)		(0.032)
Mother of children at school						0.391	
						(0.111)	
Mother of pre-school children							0.657***
							(0.001)

Observations	117	117	117	117	117	117	117
Pseudo R^2	0.200	0.227	0.240	0.254	0.258	0.271	0.302

Source: Wuwei 2008 Survey.

Notes: p-values in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Marginal effects measure the change in the probability of intended return from a unit change in the explanatory variable. Robust standard errors are adjusted for clustering by households (82 households).

Figure 1 – Kaplan-Meier survival estimate

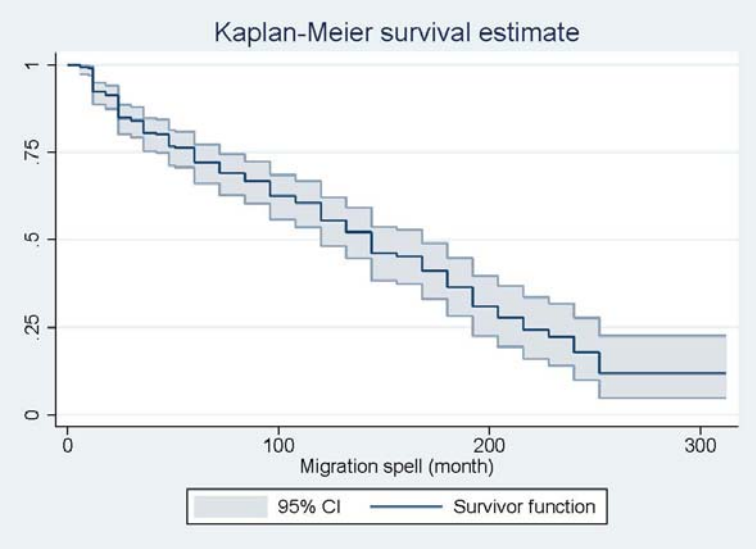

Figure 2 – Predicted discrete hazard rates

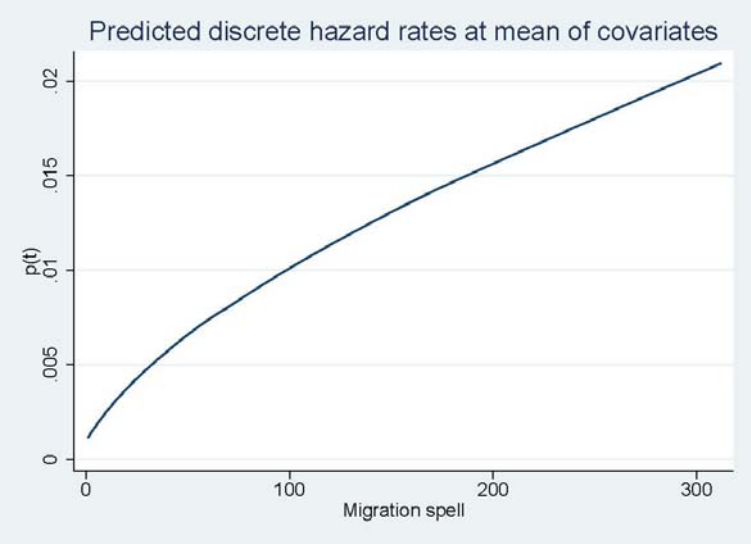

Table A1 - Hazard model estimates without unobserved heterogeneity

	Model 1	Model 2	Model 3	Model 4
Baseline hazard (log spell month identifier)	0.302***	0.295***	0.312***	0.322***
	(0.002)	(0.002)	(0.001)	(0.001)
Age at first migration (years)	0.0291**	0.0366***	0.0261**	0.0287**
	(0.026)	(0.003)	(0.047)	(0.028)
Female (=1)	0.756***	0.816***	0.769***	0.796***
	(0.000)	(0.000)	(0.000)	(0.000)
Education (years)	0.0313	0.0346	0.0209	0.0247
	(0.349)	(0.302)	(0.535)	(0.461)
Married (=1)	0.862**	0.695**	0.874**	0.861**
	(0.017)	(0.044)	(0.015)	(0.017)
Occupation before return (wage worker=1)	-0.141	-0.0558	-0.152	-0.201
	(0.511)	(0.795)	(0.500)	(0.366)
Working area before return (big city=1)	-0.0975	-0.127	-0.120	-0.132
	(0.609)	(0.502)	(0.526)	(0.495)
Log average rural per capita annual net income (2004-08)	1.447***	1.272***	1.346***	1.403***
	(0.003)	(0.008)	(0.006)	(0.004)
Household size	-0.160**	-0.162**	-0.134	-0.176**
	(0.024)	(0.045)	(0.111)	(0.024)
# old persons(>70)	-0.165	-0.151	-0.162	-0.121
	(0.464)	(0.510)	(0.489)	(0.599)
Migration status of spouse (migrant/return migrant=1)	-0.449**	-0.416*	-0.462**	-0.498**
	(0.048)	(0.065)	(0.042)	(0.028)
Having at least one child (<16) at return	-0.561**		-0.478*	-0.570**
	(0.014)		(0.088)	(0.048)
Having at least one child (6-12) at return		-0.590**		-0.335
		(0.021)		(0.244)
Having at least one child (<6) at return		-0.0342	0.140	
		(0.898)	(0.658)	
Having at least a son (6-12) at return			-0.824**	
			(0.027)	
Having at least a daughter (6-12) at return			0.0527	
			(0.864)	
Having at least a son (<6) at return				0.595*
				(0.087)
Having at least a daughter (<6) at return				0.156
				(0.660)
Constant	-18.66***	-17.50***	-17.81***	-18.20***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of person-month observations	22986	22986	22986	22986
Log likelihood	-742.7	-742.8	-739.2	-740.1

Notes: Regression estimates from a cloglog model without unobserved heterogeneity. p-values in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2 - Hazard model estimates without unobserved heterogeneity

	Model 5	Model 6	Model 7	Model 8
Baseline hazard (log spell month identifier)	0.297***	0.297***	0.309***	0.310***
	(0.002)	(0.002)	(0.001)	(0.001)
Age at first migration (years)	0.0338***	0.0372***	0.0296**	0.0343***
	(0.007)	(0.002)	(0.021)	(0.007)
Female (=1)	0.778***	0.828***	0.776***	0.817***
	(0.000)	(0.000)	(0.000)	(0.000)
Education (years)	0.0351	0.0343	0.0229	0.0309
	(0.294)	(0.310)	(0.497)	(0.358)
Married (=1)	0.785**	0.690**	0.803**	0.761**
	(0.028)	(0.046)	(0.025)	(0.033)
Occupation before return (wage worker=1)	-0.131	-0.0770	-0.155	-0.151
	(0.544)	(0.720)	(0.507)	(0.511)
Working area before return (big city=1)	-0.103	-0.130	-0.107	-0.137
	(0.587)	(0.494)	(0.574)	(0.478)
Log average rural per capita annual net income (2004-08)	1.451***	1.322***	1.374***	1.366***
	(0.002)	(0.006)	(0.005)	(0.006)
Household size	-0.133*	-0.147*	-0.127	-0.146*
	(0.089)	(0.084)	(0.144)	(0.079)
# old persons(>70)	-0.171	-0.173	-0.142	-0.149
	(0.452)	(0.455)	(0.546)	(0.521)
Migration status of spouse (migrant/return migrant=1)	-0.443*	-0.425*	-0.459**	-0.475**
	(0.053)	(0.060)	(0.046)	(0.040)
# children (<16) at return	-0.314**		-0.332	-0.225
	(0.041)		(0.186)	(0.357)
# children (6-12) at return		-0.479**		-0.279
		(0.024)		(0.351)
# children (<6) at return		-0.0237	0.173	
		(0.921)	(0.579)	
# sons (6-12) at return			-0.766*	
			(0.054)	
# daughters (6-12) at return			0.295	
			(0.437)	
# sons (<6) at return				0.346
				(0.316)
# daughters (<6) at return				-0.0348
				(0.924)
Constant	-18.95***	-17.98***	-18.18***	-18.21***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of person-month observations	22986	22986	22986	22986
Log likelihood	-743.6	-742.9	-739.9	-741.9

Notes: See Table A1.