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Instability in the Cross-Border Labor Market: A Study on the High Job Turnover of Migrant Workers from Rural Vietnam to Rural China

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Abstract: Tens of thousands of Vietnamese workers have entered the agriculture, forestry, foreign trade, and manufacturing industries in rural Chongzuo of the Guangxi autonomous region. However, over 70% of these cross-border Vietnamese workers resign at least once a month. This study applies a survival analysis on the registration data of cross-border Vietnamese workers in 2019 to investigate the main drives of high job turnover. A Kaplan–Meier plot shows that the 30-day valid period of work permits is an important source of the frequent resignation of Vietnamese workers. A Cox regression analysis presents that Vietnamese laborers working in manufacturing, working in the sugarcane industry, or from the seven Vietnam provinces closest to Chongzuo have lower risks of turnover. This study implies that Chongzuo should bring in more manufacturing enterprises, expand work permit valid periods, and offer migrant workers vocational training.

Keywords: cross-border labor; Vietnamese workers; job turnover



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1. Introduction

The Friendship International Border Gate between Chongzuo, China and Lang Son, Vietnam is a busy land port. In 2017, its number of inbound and outbound passengers was 1.786 million and its total volume of import and export freight was 2.72 million tons [1]. Chongzuo is a border region containing two city districts and five counties (Figure 1). With over 80% of its lands being rural areas, Chongzuo offers tens of thousands of jobs suitable for low-skilled laborers in sugarcane cutting, wood processing, and border trading. Factories in the border economic cooperation zone also hire large quantity of workers to process fruit, clothing, and other products. Because of the differences in regional development in China, around 0.5 million villagers migrated from Chongzuo to the southeastern coastal region for better-paid jobs, which resulted in a large labor shortage in rural Chongzuo. Meanwhile, there are about 0.3 million surplus rural laborers in the adjacent Vietnam provinces, who can fill the vacancies in the Chongzuo labor market [2].

Cross-border ethnic groups living in the China–Vietnam border region have a long tradition of working on both sides of the border, but such practices had not been legalized by the Chinese government until 2017. The Guangxi Zhuang Nationality Autonomous Region in southwest China reached a cross-border labor cooperation agreement with Lang Son, Quang Ninh, Ha Giang, and Cao Binh in Vietnam, which took effect in the beginning of 2017. In 2018 and 2019, Chongzuo approved over 200,000 work permits for cross-border Vietnamese workers [3]. The vast majority of Vietnamese migrant workers in Chongzuo have now become documented, which greatly alleviated the pressure on the China–Vietnam border control. The cross-border flows of labor and remittance have contributed to the economic development of rural areas on both sides of the border.

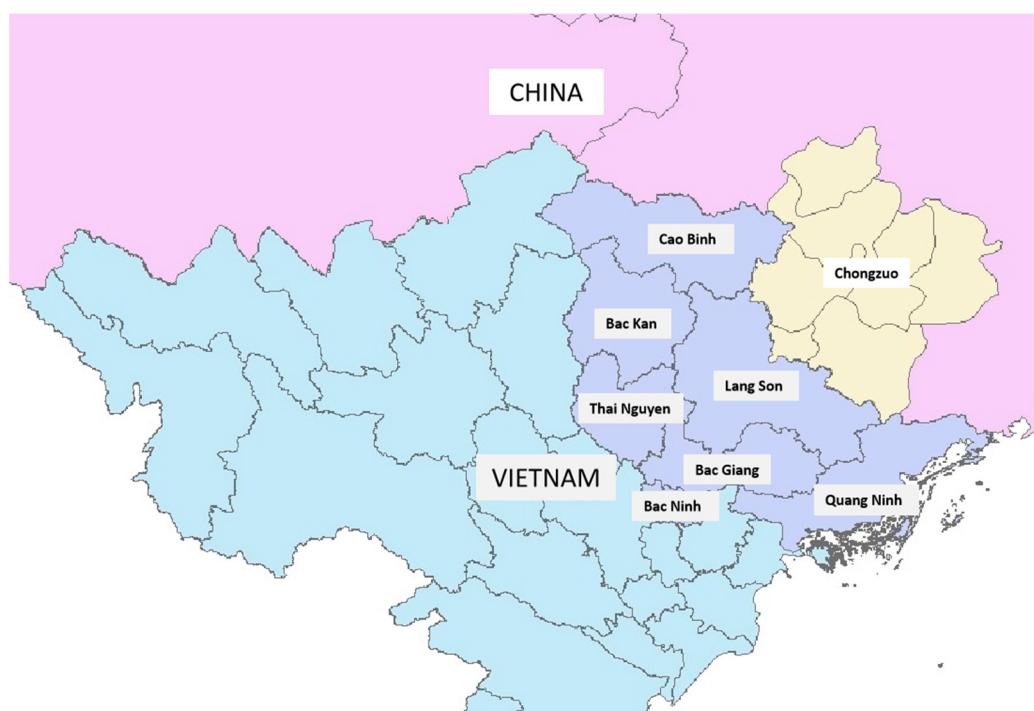


Figure 1. Locations of the Chongzuo region and the closest Vietnam provinces.

One major problem in Chongzuo is the extremely high labor turnover rate of cross-border Vietnamese laborers. Indeed, high turnover rates in industries with large amounts of migrant workers are rather common in many countries. Prior studies record annual labor turnover rates of over 60% in low-end health care and meat-packing industries where a large proportion of employees are immigrants [4,5]. There are several explanations for the high turnover rate facing migrant workers. The “revolving door” metaphor suggests that farm worker and other low-skilled jobs only serve as transition occupations for new immigrants (especially the undocumented ones), so they will give up such excessive work once they obtain more satisfactory work [6]. Some studies point out that migrant workers with high turnover rates are in fact a good match for industries with low requirements for employees’ work experience, vocational skills, and education levels. The continuous replacement of migrant workers allows such industries to reduce labor costs through saving on medical care, training, and other benefits for long-term employees [7]. The attributes of migrant workers also affect their turnover rates. Younger labor migrants are more likely to change jobs because of their richer job choices and less family pressure [8,9], whereas undocumented migrant workers facing the risk of deportation are unlikely to resign [10].

However, the turnover rates in these studies are still significantly lower than industries hiring Vietnamese laborers in Chongzuo. The monthly resignation rate of Vietnamese laborers exceeds 70%, and over 90% of them at least resigned once every two months in Chongzuo. Therefore, this study aims to deepen the understanding of the high turnover rate of migrant workers by analyzing the drivers of job turnover in Chongzuo. In the next section, this paper reviews studies on cross-border labor and puts forward the research hypotheses on Chongzuo’s high migrant worker turnover rate. An event history analysis on the registration data of cross-border workers follows. Finally, this paper ends with a discussion section and a conclusion section.

2. Literature and Hypotheses

2.1. Turnover Related to Industry

Aside from low skill requirements, easy entry, and low payment, industries where immigrants gather are often characterized by a high employee turnover rate [11]. Such workforce instability affects the interests of both employees and employers, so it has already

drawn attention from scholars. Many studies point out that industries with poor working conditions and high labor turnover rates are benefiting from employing a large scale of migrant workers, such as the meat processing industry [12], nursing home industry [4,13], and hotel industry [8]. In the United States, the annual turnover rate of certified nursing assistants reaches 65.6%, and the annual labor turnover rate in the meat processing industry exceeds 60% [4,5]. Such industries have little appeal in the local labor market, and thus increasingly depend on migrant workers with limited employment opportunities. In these cases, it is not that migrant workers make the turnover rate high, but that many migrant workers are constrained in the secondary sectors that are typically unstable [11].

Some studies find that employing migrant workers does further increase labor turnover rate, but there are legitimate reasons behind it [8]. The average age of migrant workers is significantly lower than that in the local labor market, and younger workers have higher job mobility [14]. Migrant workers often lack the protection from labor unions, which can lead to a substantial increase in passive labor turnover [8]. Migrant workers are more likely to face disrespect and discrimination; therefore, they have a stronger intention to quit their current jobs than local workers [13]. Moreover, a large number of migrant workers start their transnational labor careers in farms due to limited job choices [15]. Seventy percent of U.S. farm laborers are foreign born and over half of them are undocumented [16]. Farm work serves as a “revolving door” for new arrivals, offering them a short-term job before they earn their way into non-farm sectors [6]. Similarly, other jobs for new immigrants, such as dishwashers, service workers, and concierges, often have the characteristics of low-skill requirements, easy entry, and low salary levels, and are just a transition before migrant workers get better jobs and experience occupational assimilation [11].

In some industries hiring migrant workers, high employee turnover is not only tolerated, but is even preferred [7,17]. High employee turnover prevents workers from acquiring health benefits and employee training related to length of employment. Employees in such industries face a high risk of work injury due to insufficient skill training and work experience [7]. Migrant workers, especially the undocumented ones, lack the ability to protect their own rights, and can be used by employers to threaten and exploit local workers [12]. Changing working conditions are more often than not a bad thing for migrant workers, since constantly switching jobs keeps them powerless [18]. Many migrant workers did not choose to change jobs frequently, they just lacked accessibility to stable jobs with a comparable payment to those in these high turnover industries.

Regional differences in economic development have driven working age rural residents in western and central China to coastal cities in eastern China, resulting in a regional labor shortage [19]. Three industries in Chongzuo require manual laborers with good physical strength, and migrant workers from rural Vietnam are suitable for them. The eucalyptus industry in Shanxu Town of Chongzuo alone employs 5000 to 8000 Vietnamese workers. The area of fast-growing eucalyptus forests in Guangxi exceeds 173,000 km² [20]. Vietnamese laborers are engaged in cutting trees, cutting boards, and drying boards in the forest farms in Chongzuo, earning 2000 to 6000 RMB per month. Chongzuo also established dozens of logistics parks to provide services to international traders, and large logistics parks can each hire up to 800 Vietnamese porters. Migrant workers are paid on a piece rate in the logistics industry and the month income is about 3000 to 5000 RMB. Moreover, Chongzuo saves 280 million RMB annually from labor costs simply through introducing migrant workers into the sugarcane industry [21]. Because of the labor shortage and complex landform in Chongzuo, local villages plant sugarcane and fast-growing eucalyptus requiring little care on great tracts of land. However, an extra workforce is still necessary in the harvest seasons of these plants. From November to February in the next year, thousands of Vietnamese will become sugarcane cutters with a daily salary of 100 to 200 RMB. Offering a relatively high salary (for reference: the average monthly wage is 6.1 million VND or 1740 RMB in northern Vietnam), these three industries can continuously attract new migrant workers despite high labor turnover.

Owners possessing factories in the southeastern coastal region were attracted by the preferential policies and invested in the Chongzuo border economic cooperation zone, but they have found out that the extremely high turnover rate hinders stable production in manufacturing [22]. Factories normally pay on a piece rate, so migrant workers without necessary skills and experience would earn low wages in manufacturing. It should be noted that migrant workers in Chongzuo are dominantly farmers from rural Vietnam without former experience in factories, so it takes time for them to become familiar with the skills and rules on the assembly line. Most migrant workers resigned within three months and only earned 2000 RMB in factories, which is rather low compared to the labor-intensive jobs in Chongzuo. Factories have taken measures to keep employees because they have a higher requirement for labor stability. Some factories offer a base salary to inexperienced migrant workers, while some others hire Vietnamese administrators. The needs and actions of factories can lead to the lower job mobility of migrant workers in manufacturing.

Hypothesis 1 (H1). *Vietnamese migrant workers in manufacturing face a lower risk of turnover comparing to those in other industries.*

Among industries that can adapt to high labor turnover, the sugarcane industry seems to be the most attractive one for Vietnamese laborers. Sugarcane planting is a traditional livelihood that lasted for over a thousand years in the Chongzuo region, and in modern times, Chongzuo villagers have been hiring cross-border sugarcane cutters for decades. Consequently, Vietnamese migrant workers are not only fond of the high wage of the sugarcane industry, but they are also more accustomed to it. The advantages of the sugarcane industry suggest that its labor turnover rate might be relatively lower.

Hypothesis 2 (H2). *Vietnamese migrant workers in the sugarcane industry face a lower risk of turnover comparing to those in other industries.*

2.2. Turnover Related to Cross-Border Activities

The southwestern border region of China is famous for its numerous cross-border ethnic groups and rich ethnic culture [23]. There are 25 nationalities in Yunnan, of which 16 reside on both sides of the border. The cross-border ethnic groups in Guangxi include Bourau, Hmong, Yi, Jing, and Yao, among which Jing is of the same origin as the Yue, i.e., the majority group of Vietnam. Cross-border ethnic groups in Chongzuo have historically resided along the China–Vietnam border, and the border runs through many of their villages and farms. It was only in recent decades that these cross-border ethnic groups were affected by the modernization of China and Vietnam and formed a national consciousness [24,25]. China, Vietnam, Myanmar, Laos, and other countries grant members of cross-border ethnic groups with border resident certificates, which allow them to move more flexibly on both sides of the border. Consequently, cross-border intermarriage, small-amount trade (“bian min hu shi”), festival gathering, and labor exchange in the Chongzuo region have not been interrupted by the establishment of the modern states [26].

Bourau makes up over 90% of the population in Chongzuo, China and Lang Son, Vietnam. Bourau people are identified as the Zhuang nationality in China and identified as Nùng or Tày in Vietnam, but these three ethnic groups still maintained close ties after the Sino-Vietnamese border was demarcated in 1885–1895 [27]. Nowadays, Zhuang, Nùng, and Tày still share the same holidays, folk customs, and ethnic language. Such similarities facilitated migrant workers from border regions in Vietnam to work in Chongzuo, China. There are many Zhuang agents in Chongzuo’s cross-border labor agency who can establish mutual trust with Nùng and Tày workers and help them communicate with Chinese employers. A study on the complementary symbiotic relationship between members of Korean nationality and Korean immigrants in Guangzhou points out that cross-border ethnic groups can more easily straddle the “structural holes” (i.e., the gaps in the social network) and form bridges between immigrants and locals [28].

Even though border residents can cross borders legally through border gates with their certificates, they have gotten used to take small passes in mountains to avoid inspections and save time [29]. There is no dangerous terrain between China and Vietnam, and it only takes half an hour to cross the hills between Lang Son and Chongzuo or to cross the rivers between Quang Ninh and Dongxing. Such cross-border mobility may also affect the stability of Vietnamese migrant workers from the border region. While migrant workers from other parts of Vietnam live in dormitories near their workplaces in Chongzuo, border residents usually work in Chongzuo during the day and return to villages back in Lang Son at night. Border residents may not be able to come back to work if border control is strengthened. Moreover, border residents have access to additional job opportunities through Zhuang labor agents or cross-border social networks, which may encourage them to change jobs more frequently. The above discussion leads to our third hypothesis.

Hypothesis 3 (H3). *Vietnamese migrant workers from the seven Vietnam provinces closest to Chongzuo face a higher risk of turnover comparing to those from other regions in Vietnam.*

2.3. High Turnover Related to Migrant Worker Policy

Many Vietnamese in Chongzuo have experienced a transition from illegal to legal employment, while prior studies show that documented migrant workers are more likely to change jobs than undocumented ones [10,30]. Undocumented workers facing the threat of deportation will work for longer hours and avoid the extra risk of switching jobs [10]. Research based on the National Agricultural Workers Survey (NAWS) also shows that immigrants become less likely to work in farms after obtaining legal status [30]. This study also reveals that documented immigrants are more likely to abandon prior jobs in responding to economic changes, whereas undocumented immigrants tend to keep their original jobs during an economic crisis.

A large number of undocumented migrant workers appeared in the Guangxi autonomous region around 2000, and by 2010 there were already over 50 thousand undocumented Vietnamese sugarcane cutters in the Chongzuo region alone [31]. The vast majority of Vietnamese laborers in this region became legal workers after Chongzuo launched the cross-border labor pilot program in 2017. Legal status increases the negotiation power of Vietnamese migrant workers against Chinese employers, which may lead to a higher labor turnover rate in Chongzuo.

While the migrant worker policies in Chongzuo facilitate the legal employment of Vietnamese workers, the regulation on the validity period of work permits has received complaints from different groups involved in cross-border labor [32]. Work permits for migrant workers in Chongzuo are valid for only 30 days, so Vietnamese workers need to go back to the border gate every month to renew their work permits. In fact, shortening the visa validity period is a measure of strengthening the administration of foreigners in China with business or tourist purposes, since each time they renew visas, the Exit and Entry Administration can update their information and confirm the necessity of their continued stay [33]. Now, a similar administrative measure is applied to migrant workers, causing them to spend 200 RMB each month on a work permit renewal. Employers also accused the 30-day work permit as an important reason for staff turnover, pointing out that a large proportion of migrant workers changed jobs or left China when their work permits became invalid. We hereby hypothesize that there is an institutional cause for the high turnover rate of migrant workers in Chongzuo.

Hypothesis 4 (H4). *Vietnamese migrants face a higher risk of turnover when their job duration is close to multiples of 30 days (e.g., 30 days, 60 days, 90 days, etc.).*

3. Data and Methodology

The analysis of this study is based on Chongzuo work permit registration data of Vietnamese migrant workers ranging from June to December in 2019. They are desensitized

data that only contain gender and region of origin (the data do not allow identification of the exact province of origin, since it often converges several provinces into one region, i.e., Bac Giang province and Bac Ninh province are both coded as Region 12 in the data) of the migrant workers, as well as the industry and start and end dates of their registered jobs. In the data, there are a total of 33,451 Vietnamese who worked legally in Chongzuo during those seven months, and a total of 91,496 jobs, or 2.6 jobs per migrant worker (Table 1). Males account for nearly 60% of the Vietnamese workers. Their total working duration in China is on average 82 days and the average duration of jobs is very close to 30 days. Vietnamese migrant workers are mainly engaged in logistics; the fast-growing eucalyptus industry; manufacturing; the sugarcane industry; rosewood industry (rosewood factories mainly hire carvers instead of factory workers, so their turnover pattern would be rather different from other manufacturing factories, hence, the rosewood industry is separated from manufacturing in data analysis); and service industry. Jobs in the sugarcane industry only account for 7.50% of the total jobs. However, the sugarcane industry is a seasonal industry that only hires migrant workers from November to February, so the proportion of jobs in this industry rises to 12.8% in December.

Table 1. Descriptive statistics.

Migrant Workers		N = 33,451			
	n	Percentage			
Male	19,984	59.74%			
From 6 closest provinces	22,078	66.00%			
	Mean	SD	Min	Max	
Number of jobs	2.6,007	1.7759	1	12	
Working duration in China	82.0555	59.2628	30	242	
Registered Jobs		N = 91,496			
	n	Percentage			
Industry					
Logistics	33,067	36.14%			
Fast-growing eucalyptus	26,333	28.78%			
Manufacturing	17,393	19.01%			
Sugarcane	6862	7.50%			
Rosewood	5307	5.80%			
Service	2534	2.77%			
	Mean	SD	Min	Max	
Duration of job (total)	29.9986	8.2689	2	180	
Logistics	29.6267	7.4389	2	150	
Fast-growing eucalyptus	30.1826	8.5743	2	180	
Manufacturing	31.0511	10.6435	3	141	
Sugarcane	29.2645	3.7985	2	90	
Rosewood	29.0931	6.6573	3	120	

The regions of origin of migrant workers in Chongzuo basically include all 58 provinces and 5 municipalities in Vietnam. Most migrant workers come from the seven Vietnam provinces closest to Chongzuo, namely Lang Son, Cao Binh, Bac Ninh, Bac Giang, Bac Kan, Thai Nguyen, and Quang Ninh. Standard deviation ellipse plots demonstrate that from June to December 2019, the sources of migrant workers are increasingly concentrated in the northern part of Vietnam (Figure 2). Vietnamese workers from the seven closest provinces gradually increased from 60% to 80% of all migrant workers in Chongzuo. This mainly reflects the seasonal differences in labor export from northern Vietnam, where most of the labor force is engaged in agriculture, and affluent labor increases significantly in winter.

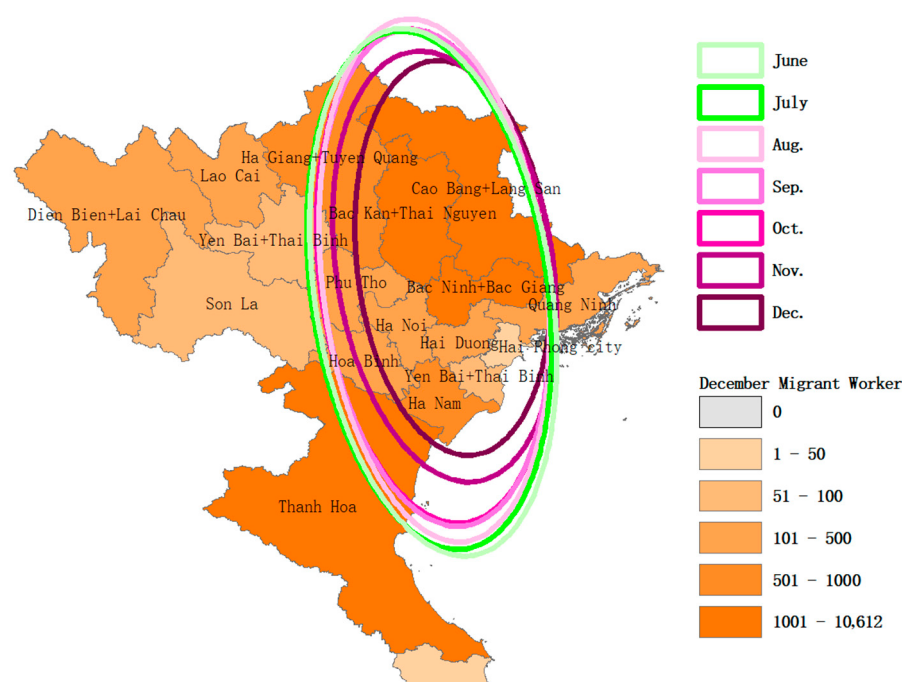


Figure 2. Migrant workers' regions of origin and standard deviation ellipse plots.

In this study, we analyze data using event history analysis methods. A Kaplan–Meier curve is generated to demonstrate the cumulative incidences of job turnover over time. Then, Cox's proportional hazard regression models (Cox model) are used to examine the influence of industry and region of origin on hazard ratios of turnover [34]. Being a semi-parametric model, the Cox model allows us to calculate the ratio between hazard rates of exposure and non-exposure groups, without identifying the exact distribution of the baseline hazard, so it fits the purpose of our study rather well. There are three Cox models predicting the hazard rate of job turnover in this study, each of which contains one of the following dichotomous variables as an independent variable: whether working in manufacturing, whether working in sugarcane cutting, and whether from the seven closest provinces. The proportional hazard assumption is tested on these Cox models using Log-Log curves and a time-dependent covariate test [35].

For job i that turnover event happens on day T_i , its likelihood of turnover can be presented as follows:

$$L_i(\beta) = \frac{\exp(\beta x_i)}{\sum_{j: T_j \geq T_i} \exp(\beta x_j)}$$

where x_i and x_j represent the covariate (one of the three dichotomous variables mentioned above) for job i and job j , and β represents the covariate coefficient. The $\exp$ is an abbreviation for the exponential function, and $\sum_{j: T_j \geq T_i}$ refers to summing up $\exp(\beta x_j)$ for all jobs with a turnover event on and after day T_i .

Meanwhile, the likelihood of job turnover for the whole sample can be presented as the following equation:

$$L(\beta) = \prod_{i: \delta_i = 1} \frac{\exp(\beta x_i)}{\sum_{j: T_j \geq T_i} \exp(\beta x_j)}$$

where $\prod_{i: \delta_i = 1}$ refers to the multiplication function of the likelihood of turnover for all jobs with a turnover event in the sample. Through the maximum likelihood estimate function, we calculate the value of the covariate coefficient β that maximizes $L(\beta)$.

In our study, the hazard rate refers to the rate of turnover for a job on a given day. The hazard ratio refers to the ratio of the hazard rates of jobs with and without a certain risk (e.g., belongs to a certain industry). The hazard ratio is larger than 1 if the given risk

increases the turnover hazard and smaller than 1 if that risk reduces the turnover hazard. It equals to $\exp(\beta)$ in the Cox models. Therefore, the first two hypotheses of our research can be validated if the hazard ratio of a job in the manufacturing or sugarcane cutting industry is significantly smaller than 1, and the third hypothesis can be validated if the hazard ratio of workers from the closest Vietnamese provinces is significantly larger than 1.

4. Results

There are 91,496 observations (jobs) in the data analysis, with a total analysis time at risk being 2.75 million days and daily incidence rate being 2.6%. Nearly three out of four jobs ended before 30 days, and over 90% of the jobs ended before 60 days. Figure 3 shows the Kaplan–Meier survival estimate of jobs engaged by Vietnamese migrant workers in Chongzuo, demonstrating that the odds of turnover become extremely high when a job lasts nearly 30 days, 60 days, or 90 days. This result provides indicative support to our hypothesis 4 about the influence of 30-day work permits on migrant workers' turnover.

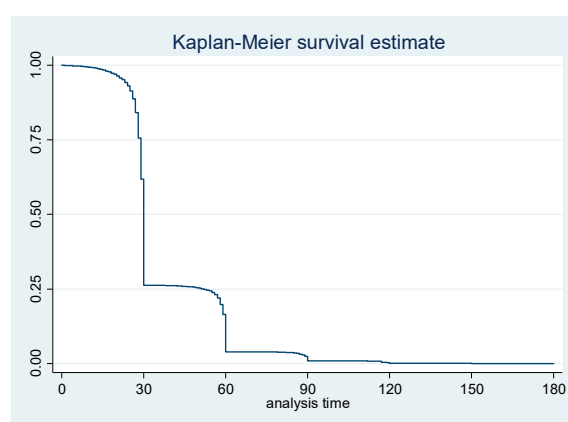


Figure 3. Kaplan–Meier survival estimate of migrant workers' jobs.

We first generate the Log-Log curves (plotting $-\ln(-\ln(\text{survival probability}))$ against $\ln(\text{time})$) to examine whether the curves of jobs affected by influential factors (darker curves) parallel with the curves of jobs not being influenced (lighter curves) [36]. Figure 4 presents that even though the darker curves are very close to the lighter ones, curves with different colors rarely intersect. In fact, intersects are mostly likely to appear when $\ln(\text{time})$ equals 4.1, 4.5, or 4.8, which correspond to job durations of 30 days, 60 days, and 90 days ($\ln(60) = 4.1$, $\ln(90) = 4.5$, $\ln(120) = 4.8$). This again reflects the influence of work permits that are only valid for 30 days. Log-Log curves demonstrate that the three Cox models generally meet the proportional hazards assumption.

A time-dependent covariate test is one of the most accurate methods of testing proportional hazard assumption [35]. Such a test is conducted through adding interaction terms of influential factors and time into the original Cox models. Table 2 presents regression results of Cox models with time-varying covariates (TVCs). The main effects of working in manufacturing, working in the sugarcane industry, and originating from the seven Vietnam provinces closest to Chongzuo are all significant at the 0.001 level, while none of the TVCs is statistically significant. Therefore, we can be quite confident that the three Cox models in this study meet the proportional hazards assumption.

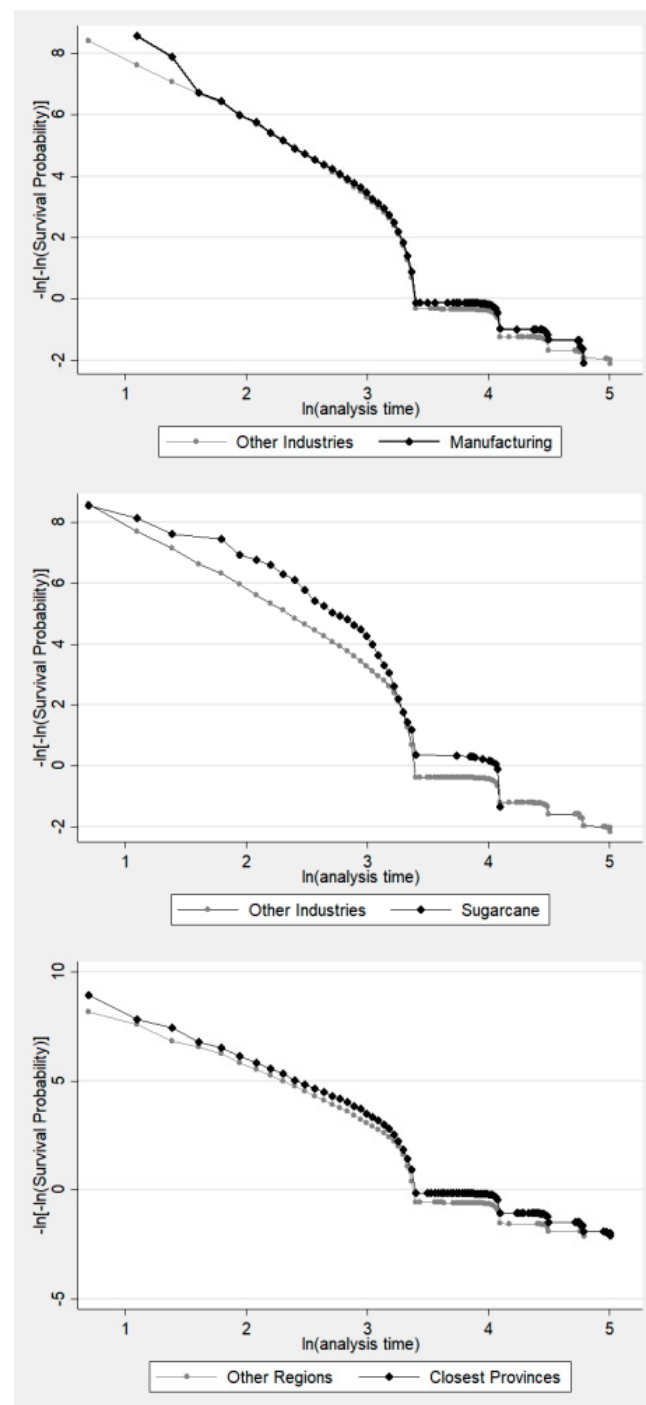


Figure 4. Log-log curves of working in manufacturing (**top**), working in sugarcane cutting (**middle**), and from the seven closest provinces (**bottom**).

Table 3 shows the hazard ratios of Cox models without time-varying covariates. The turnover hazard of Vietnamese migrant workers in manufacturing is only 85.4% of those in other industries, whereas the turnover hazard in the sugarcane industry is only 59.5% of the hazard rate in other industries. The effects of both indicators on turnover are significant at the 0.001 level. These results support our hypotheses 1 and 2, indicating that migrant workers in certain industries in Chongzuo are systematically more stable than those working in the rest.

Table 2. Time-dependent covariate test of the three Cox models.

	HR	SE	z	p > z	Ward Chi ²
Model 1. Manufacture					354.54
Main	0.832 ***	0.030	−6.13	0	
TVC	1.001	0.0009	0.92	0.359	
Model 2. Sugarcane					1663.12
Main	0.635 ***	0.089	−5.09	0	
TVC	0.998	0.003	−0.74	0.457	
Model 3. Seven Closest Provinces					3157.05
Main	0.672 ***	0.032	−12.44	0	
TVC	1.002	0.0011	1.43	0.152	

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 3. Regression results of the three Cox models on the incidence of turnover.

	HR	SE	z	p > z	Ward Chi ²
Model 1. Manufacture	0.854 ***	0.010	−15.63	0	355.17
Model 2. Sugarcane	0.595 ***	0.014	−36.16	0	1570.43
Model 3. Closest Provinces	0.702 ***	.008	−45.36	0.000	3118.14

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Model 3 in Table 3 suggests that the turnover hazard of migrant workers from the seven Vietnam provinces closest to Chongzuo is only 70% of those from other regions of the country. This suggests that border residents are less likely to change jobs than migrant workers from other parts of Vietnam. The potential explanations for this finding are three-fold. First, the influence of cross-border mobility might have led to shorter work duration in China instead of boosting their job turnover. The data show that migrant workers from the seven closest provinces on average work in China for 113.76 days, while those from other parts of Vietnam on average work in China for 144.12 days. Perhaps the lower costs and risks for border residents to come to China make it easier for them to end a journey of cross-border labor. Second, border residents are disproportionately more likely to be employed in the sugarcane industry, which has a lower turnover rate overall. It has been a tradition for border residents to help cut sugarcane when their co-ethnics on the other side of the border are short of labor. Additionally, they are familiar with the Chongzuo region and are more adaptable to sugarcane cutting jobs in the hilly terrain than Vietnamese people from other regions. Third, the convenience for border residents of communicating with Chongzuo locals might help them reduce the turnover hazard related to adaptation or discrimination.

Figure 5 displays the model fitting plots for the Cox models. Red curves present the observed turnover of migrant workers affected by one of the three influential factors, while orange curves present the predicted turnover of these migrant workers. Blue curves present the observed turnover, and green ones present the predicted turnover of migrant workers not being affected by the three influential factors. The fitted curves of Model 1 and Model 3 are highly coincident with the actual curves, confirming that Cox models can accurately predict the turnover hazard for Vietnamese migrant workers in manufacturing or from the seven provinces closest to Chongzuo. However, the predicted curve of turnover for migrant workers in the sugarcane industry is less coincident with the observed curve, probably due to the smaller size of time points for analyzing sugarcane cutters. The sugarcane harvest season began in November and our data range from June to December in 2019, so turnover in the sugarcane industry is predicted based on data of a shorter time range than other industries.

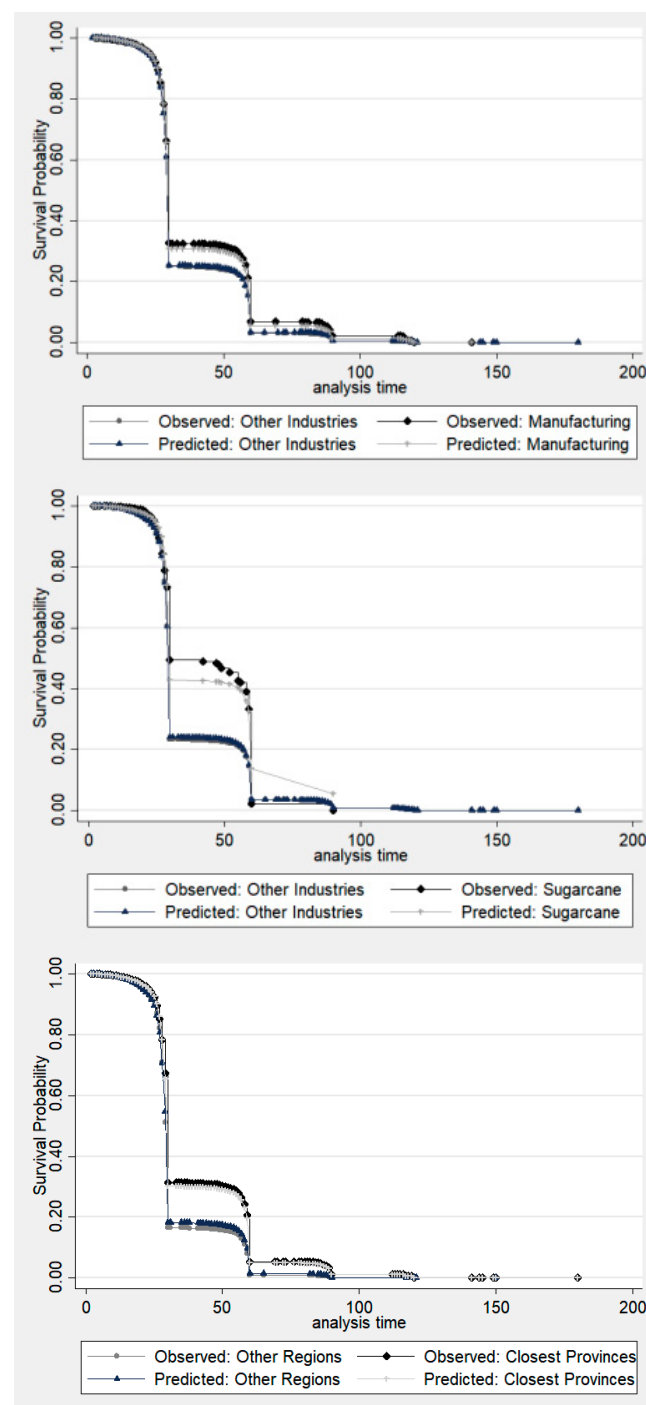


Figure 5. Model fitting plot of working in manufacturing (**top**), working in sugarcane cutting (**middle**), and from the seven closest provinces (**bottom**).

5. Discussion

This study examines potential influential factors on the labor turnover of Vietnamese migrant workers in Chongzuo, China, where the job mobility is remarkably higher than that in Western countries. In this region, the monthly turnover rate of migrant workers can reach as high as 216%. Many employers in Chongzuo evade hiring too many migrant workers on the same day, so as to reduce the hazard of concentrated resignation and production interruption. Based on a survival analysis of work permit registration data, our study illustrates that cross-border traditions have a mixed influence on the job mobility of border residents. On the one hand, migrant workers from the seven Vietnam provinces

closest to Chongzuo (i.e., Lang Son, Cao Binh, Bac Ninh, Bac Giang, Bac Kan, Thai Nguyen, and Quang Ninh) have a 30% lower risk of turnover than those from other regions. On the other hand, the total duration of working in China for Vietnamese border residents is on average 30 days shorter than that for non-border residents.

This study also reveals that migrant workers in the manufacturing and sugarcane industry have approximately 15% and 40% lower risks of turnover. Consistent with previous studies conducted in the U.S. [7,12], tolerance toward labor turnover varies greatly across industries in Chongzuo. Manufacturing is extremely uncomfortable in an unstable labor market, so the factories in Chongzuo have adopted strategies to reduce labor mobility. For instance, even though in factories wage is normally piece-rate, these factories often offer newly employed Vietnamese workers a minimum wage of over 2000 RMB for the first few months, ensuring them a reasonable income while they learn techniques and become familiar with the equipment. Despite most Vietnamese workers resigning as soon as the minimum wage period ends, this strategy does reduce turnover in manufacturing. Other industries that occupy the bulk of the cross-border labor market in Chongzuo can accommodate the high mobility of labor. There is seasonal variation in the demand for migrant workers in agriculture. The labor demand of freight yards largely depends on the flow of imported goods, so a freight yard recruiting hundreds of Vietnamese laborers when popular fruits are in season may only hire a dozen migrant workers in the off-season. Such a seasonal change in recruitment has prompted Vietnamese workers engaged in these industries to switch jobs more frequently. The only outlier is the sugarcane industry, and the reason for its lower turnover rate is many Vietnamese border residents have come to China to work on sugarcane fields and rarely quit their sugarcane cutting jobs.

Our results from the Kaplan–Meier survival estimate confirm that there is an institutional cause of high turnover among migrant workers in Chongzuo. Since the majority of jobs engaged by Vietnamese migrant workers ended within 30 days, it is highly possible that the work permits only valid for 30 days have increased the risk of turnover. In fact, the Chongzuo government has already proposed to expand the work permit's valid period in order to reduce labor turnover and boost the local economy, but this has not been approved by higher-level governments. Local governments have relatively limited powers on border management, whereas higher-level governments need to take comprehensive consideration of the impact of policy on foreign relations and border stability.

The turnover rate of migrant workers in Chongzuo is at an inappropriately high level, and our study suggests that adjusting the industrial structure and policies can help reduce turnover. First, Chongzuo should offer manufacturers more political support and increase the number of manufacturing enterprises that hire migrant workers. A larger share of manufacturing jobs in the labor market would help increase labor stability and work diversity. Manufacturing has more modernized production and management procedures comparing to agriculture and logistics, so manufacturing jobs are less harmful to workers' health than more labor-intensive jobs. Manufacturing jobs valuing skill accumulation are also more rewarding for individual employees and the local economy in the long run. Second, the valid period of work permits must be extended to free migrant workers, employers, and local governments from the monthly routine of work permit applications. Third, governments and employers in Chongzuo should cooperate to offer Vietnamese migrant workers vocational training. Skills for particular jobs not only ensure higher income for migrant workers but also reduce their job mobility and then increase the stability of production in Chongzuo.

This study is not without limitations. Migrant worker registration data collected before May 2019 have not been granted to researchers, and cross-border labor services in Chongzuo have been suspended since 2020 due to COVID-19. Affected by the shortage of data collected in January through May, findings of this study cannot capture the whole situation throughout the year. Moreover, because of the limited information on migrant workers and their jobs in the data, we can only include a few independent variables in our regression models. Through fieldwork, we notice that family context can be rather

influential on the job stability of migrant workers. For instance, married migrant workers with children are less likely to change jobs in China, while they also prefer factory jobs over the heavy manual labor jobs. Educational attainment also varies across industries, with manufacturing and service industries hiring relatively more educated workers, which can in turn affect the turnover rate. However, such information is not available in the registration data. Despite these limitations, our study, based on the full sample of Vietnamese workers in Chongzuo registered between June to December 2019, presents an unbiased picture of migrant workers' temporal, spatial, and industrial distribution, hence allowing for a more precise analysis of causes of labor turnover.

6. Conclusions

Our study shows that the high job turnover rate of Vietnamese migrant workers in Chongzuo, China results from the mixed effects of industrial, regional, and institutional influences. In this employment environment with such high turnover, the sugarcane industry only recruiting workers in the winter has become an industry with relatively lower turnover because of its high salary, whereas the manufacturing industry pursuing labor stability is still badly affected by high turnover. Moreover, Vietnamese migrant workers from provinces adjacent to Chongzuo demonstrate a rather different turnover pattern from those with other origins. These Vietnamese border residents are less likely to change jobs, but they are more likely to end their cross-border labor experience in China. Finally, the preliminary policies on migrant workers in Chongzuo objectively encourage turnover of migrant workers and thus exacerbate labor instability.

This study is conducted in a region where cross-border labor migration has only been legalized for five years. Therefore, the instability of the migrant labor supply not only resulted from economic and demographic factors but is also aggravated by the institutional incompatibility and instability of experimental policies. Compared to existing studies on the turnover of migrant workers, a study on this new destination of documented migrant workers offers an opportunity to examine the effects of relatively constant background factors, and hence deepens understanding of migrant worker turnover with a dynamic perspective.

Since the turnover rate in Chongzuo is over ten times of that in Western countries, our conclusion may not be universally valid. However, the influential factors of a turnover hazard inspected in our study can have similar yet less intense effects in other contexts. Future studies can replicate these associations in different regions and examine the effectiveness of these factors. Moreover, labor market dynamics in the border region changed greatly by COVID-19. How do cross-border migrant workers' job turnover and other characteristics vary before, during, and after the global pandemic? For instance, scholars can collect information on the employment history of cross-border Vietnamese workers through a survey and compare turnover patterns of the pre- and post-pandemic era. Further studies should also pay attention to the potential policy change that China may adopt because of the labor shortage in the border region. In sum, instability in the cross-border labor market is an important issue that should be further explored.

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