Natural Disasters, Migration and Urban Insecurity in China

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Abstract:

This paper examines the effect of natural disasters, extreme events caused by gradual climate change, on urban insecurity, through the channel of rural-urban migration. Utilizing the 2002 wave of CHIP (China Household Income Project) data, this paper finds that natural disasters increase migration in a small magnitude. However, the structure of migrants is changed significantly. Some rural residents are forced to move but would have stayed in the countryside had there been no natural disasters. Those forced to move due to natural disasters have the lowest earnings level in cities, compared to urban residents and other migrants. Chances are that migration driven by natural disaster may have an adverse effect on urban security. This paper then explores ways to foster urban security with the growing number of migrants, especially regarding reforms in the social security system and strength from civil society.

Keywords: Natural Disasters, Migration, Urban Insecurity, China

1. Introduction

Climate change is always regarded as a gradual process. However, abrupt climate changes can happen, in the form of droughts, floods and heat waves, among others (Helmer, 2006). As extreme events, natural disasters always cause serious damages to particular population groups and regions. Although the occurrence and magnitude of natural disasters is always distributed unequally, the adverse effects can be spread across space. Since their income sources are more dependent on nature, rural areas are more vulnerable to natural disasters than urban areas. Nevertheless, urban areas are not immune to natural disasters. Instead, the adverse effect of natural disasters can be passed from rural to urban areas through channels like migration, food crisis, and environmental degradation. The aim of this paper is to explore the role of migration in linking natural disasters in rural areas with urban insecurity.

Prior to reform and opening, migration in China was strictly prohibited. The *hukou* (household registration) system and collective farming scheme successfully bound

rural residents to their land. Echoing the booming demand for labor in urban areas after reform and opening, the restrictions on migration were gradually loosened and the number of rural migrants in Chinese cities steadily increased. According to the figures issued by the National Bureau of Statistics of China, the number of rural migrants in urban areas was 118, 132 and 140 million in 2004, 2006 and 2008, respectively (Research Division of State Council, 2006; NBS, 2007, 2009). Although migrants can obtain a higher income than what they had in the countryside, migrants are treated differently in cities from their urban counterparts. Compared to urban workers, migrant workers always work overtime, take low-end jobs, and have lower earnings (Meng and Zhang, 2001).

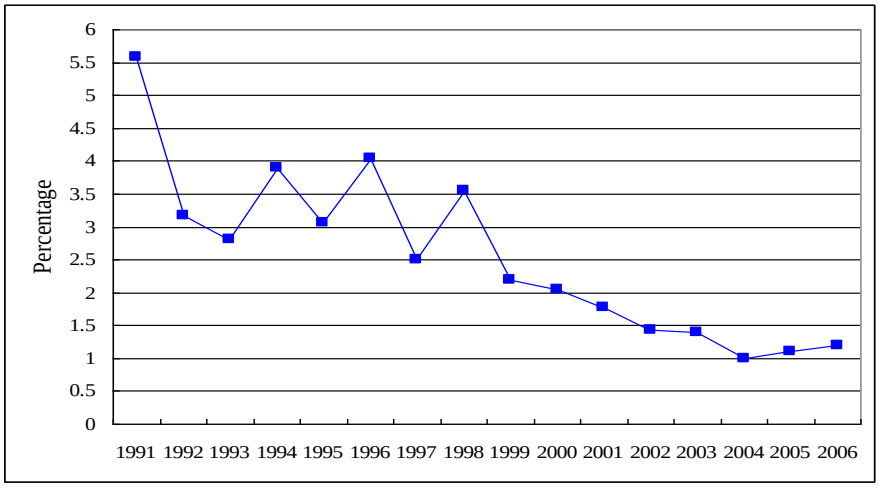
According to economic theory, migrants leave the countryside in response to higher income flows in urban areas. However, in rural areas hit by natural disasters, some farmers may not be able to continue farming due to the damage of land, fixed productive assets, or even houses. These farmers are forced to migrate to urban areas to try their luck. Compared to the voluntary migrants, the forced migrants are not well prepared for city life. They may come across difficulties in finding jobs and have to accept lower earnings due to their lack of skills. However, they always face greater economic burdens because they have greater incentives and pressure to save money for household members left behind in the countryside or for reconstruction in the hometown even if there is no household member.

A question naturally arises. Will these migrants be a threat to urban insecurity? If yes, is there any way to counteract it? This paper then explores the possibility that migration driven by natural disasters affects urban insecurity. Utilizing the 2002 wave of CHIP (China Household Income Project) data, this paper finds that those forced to move due to natural disasters have the lowest earning level in cities, compared to urban residents and other migrants. Chances are that migration driven by natural disaster may have adverse effects on urban security. This paper then discusses ways to foster urban security with the growing number of migrants, especially regarding the role of the social security system and civil society.

2. Natural disasters in China

Natural disasters are used as a short-term indicator of climate change. Their differences lie in the dimensions of both time and place. Climate change evolves gradually, but natural disasters occur suddenly. Geographically, climate change spans much wider regions but natural disasters are more concentrated in several regions. Although climate change has significantly adverse effects, natural disasters can cause catastrophic damage in affected regions. Since the 1960s when reliable statistics became available, it is reported that the number of disasters and people affected by disasters has risen dramatically (IFRC, 2003, cited from Schipper and Pelling, 2006).

China is no exception to natural disasters. Utilizing the data of surface air temperature anomalies spanning from 1880 to 1998 in China, Qian and Zhu (2001) find that the occurrence of natural disasters is a long-lasting problem in China. For instance, the hydrological cycle led to the variations in runoff in northwest China, no-flow in the lower reach of the Yellow River and the salinization of soil in northeast China. In contrast, intermittent floods along the Yangtze River and the frequent occurrence of drought have resulted in huge losses during the last decade for China (Qian and Zhu, 2001).

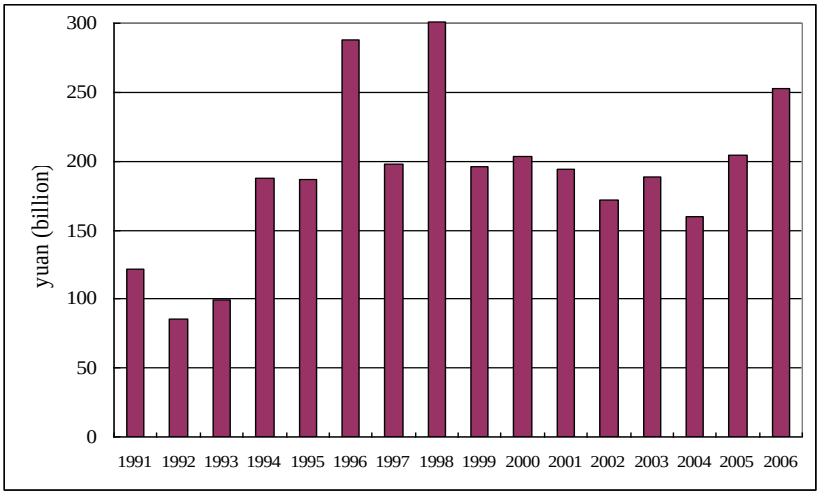


Source: Qi (2008)

Figure 1. Percentage of losses caused by natural disasters in GDP

Natural disasters are always blamed for catastrophic damages. As China is a big country with many regions susceptible to natural disasters, the overall probability of coming across natural disasters is not expected to be low. Following the high frequency of natural disasters, China suffers seriously from natural disasters, judging from the losses caused by natural disasters. Figure 1 depicts the percentage of losses caused by natural disasters in GDP. We find that the proportion of losses brought about by natural disasters in GDP in 1995 was 5.5% and then oscillated between 2.5% and 4% from 1992 to 1998. However, this proportion started to decline after 1998, decreasing from 2.2% in 1999 to 1.2% in 2006, although there is a slight increase between 2004 and 2006. Relative to GDP, the adverse effect of natural disasters seems to decrease. However, as Figure 2 indicates, when measuring the losses beget by natural disasters in absolute terms, the adverse effect of natural disasters is still significant in China. Cleary, Figure 2 reveals a different pattern than Figure 1. From Figure 2, we can see that the change in losses engendered by natural disasters follows an inverted-U shape. From 1991 to 1993, the losses caused by natural disasters are within the region of 85 and 121 billion Chinese *yuan*. However, the losses began to

increase rapidly after 1993. Except for three extreme years, 1996, 1998 and 2006, the losses caused by natural disasters are in the vicinity of 180 billion Chinese *yuan*.



Source: Qi (2008)

Figure 2. Losses Caused by Natural Disasters

Figures 1 and 2 reflect the overall damage by natural disasters in China. However, the exposure to natural disasters is always uneven. Since rural people are more likely to be affected by natural disaster and their ability to cope with natural disaster is weaker, they are expected to suffer more from natural disasters than their urban counterparts. When hit by natural disasters, the land, houses, and fixed productive assets of rural residents may be destroyed. There are also possibilities that the old style of production technology or way of living is not applicable after the occurrence of natural disasters. Rural residents are then forced to migrate to make a (better?) living. The next section will analyze the effect of natural disasters on migration in detail.

3. Migration and natural disaster

There are many reasons that rural residents move to cities. Economists summarize these reasons into two broad categories, push and pull factors (Zhao, 2005). The existence of surplus labor in rural areas is often regarded as the major push factor. In the Chinese context, pull factors mainly reflect the higher income levels in urban areas. In 2002, the urban-rural income ratio is 3.12. Adjusted for price differentials and implicit subsidies enjoyed by urban residents, the urban-rural income ratio remains relatively unchanged (Li and Luo, 2007). Previous literature also analyzes the causes of migration in more detail, by exploring the role of age, education, gender,

and the migration network in migration (Zhao, 2005).

International literature also discusses the effect of natural disasters on migration. Belcher and Bates (1982) believe that natural disasters serve as a push factor for rural residents to leave the source community. The same view is held by Swain (1996). However, it is also argued that there may be a negative relationship between natural disasters and migration, due to the inflow of migrants in search of work in reconstruction in affected areas (International Organization for Migration, 2007). Which effects dominate in the decision of migration in China? Unfortunately, the effect of natural disasters on migration seems to be ignored, mainly due to the data limitation. We will explicitly discuss the effect of natural disasters on migration.

The data we use comes from the 2002 wave of CHIP (China Household Income Project) survey data, including 37969 individuals in 9200 households living in 22 provinces. The special feature of this data regarding our topic here is that it provides information about natural disasters, which makes it possible to add natural disasters into the analysis of migration.

Since the aim of our econometric analysis is to identify those rural residents forced to move in the presence of natural disaster, we adopt this analytic procedure. First, we estimate using the Probit model of migration for those not affected by natural disasters. Second, we predict the probability of migration for those encountering natural disasters using the coefficients of the Probit model. Third, we find those whose migration status was changed by the existence of natural disasters, by comparing the actual and predicted (counterfactual) migration status. If the actual and predicted migration statuses differ, then the migrants can be regarded as migrants merely driven by natural disasters.

Table 1. Probability of migration for those not affected by natural disasters: Probit model

	Coefficient	Standard Errors
Male	0.778***	0.032
Age	0.032***	0.011
Age squared	-0.001***	0.0001
Schooling	0.045***	0.007
Married	-0.282***	0.054
Minority	-0.674***	0.056
Have at least a child	0.014	0.019
Have at least an elderly	-0.005	0.033
Agricultural land (*mu*)	-0.017***	0.001
Constant	-0.674***	0.180
Pseudo R^2	0.2118	
Observations	9419	

Note: ***, **, * denote statistically significance from zero at .01, .05 and .1 levels, respectively

The observations we have chosen for regression are rural residents aged 16-60, currently working and not affected by natural disasters. For these 9419 observations, we use regression on the occurrence of migration on independent variables including male, age and its squared term, schooling, marriage status, ethnic status, household demographic structure, and agricultural land. The estimation results of Probit model are reported in Table 1.

As can be seen from Table 1, the coefficients of most independent variables are significant with the expected signs. Male rural residents are more likely to migrate than their female counterparts. Looking at the coefficients of age and age squared together, there seems to be an inverted-U shape of the relationship between age and migration. However, a closer look suggests that the probability of migration simply decreases with age.[1] Education increases one's probability of migration. Compared to their respective counterparts, married and minority people are less likely to migrate. Rural residents with more agricultural land are also more reluctant to migrate.

The regression results presented in Table 1 are used to infer the probability of migration for those affected by rural residents. The prediction suggests that among 8567 individuals suffering from natural disasters, there are 6725 individuals whose choice of migration is not affected by natural disasters. Among these 6725 individuals, 6122 stay in the countryside and 603 migrate out. However, 1842 individuals change their location due to natural disasters. Eight-hundred seventy-six farmers stay in the countryside but would migrate had there been no natural disasters, while 966 migrants would stay if there had been no natural disasters.

Table 2. Actual and predicted migrants among rural residents affected by natural disasters

Predicted / Actual	Migrate	Stay	Total
Migrate	603	966	1569
Stay	876	6122	6998
Total	1479	7088	8567

From our econometric analysis, we can conclude that natural disasters lead to greater extents of migration in China and the magnitude of the effect of natural disasters on migration is not so high. However, natural disasters do not simply increase the quantity of migrants. More importantly, they change the structure of migrants. Since the forced migrants are often not well prepared to migrate, one can imagine that they face greater difficulty in finding jobs in cities and greater possibility of having a lower level of earnings. Is there any possibility that these forced migrants threaten urban insecurity? We will explore this question in the next section.

[1] The peak point is 16 years old, which is exact the lower age limit of our sample chosen.

4. Migration and urban insecurity

As discussed earlier, migrants in China are confronted with labor market segmentation. Utilizing the 1995 and 2002 wave of CHIP data, Démurger et al., (2008) found that a significant portion of wage inequality can be attributed to labor market segmentation in urban China. More importantly, the magnitude of labor market segmentation between urban workers and rural migrant workers increased from 1995 to 2002. Meng and Zhang (2001) also pointed out that labor market segmentation is a significant contributor to growing income inequality in urban China.

One kind of labor market segmentation lies in occupational segregation between urban local workers and rural migrant workers. Using the Shanghai survey data in 1995, Meng and Zhang (2001) report 36.69% of urban local workers held white-collar jobs, whereas only 3.36% of rural migrant workers take white-collar jobs. The segmentation inside the labor market still exists despite the development of the labor market. Based on the 2002 urban CHIP data, Démurger et al. (2008) found that professionals, technicians and office workers comprise 52.36% of urban local workers, while the proportion for rural migrant workers working in these occupations is 6.65%.

Both the labor market segmentation and the less preferable characteristics of migrant workers are responsible for the earnings gap between urban and migrant workers. Previous literature made attempts to gauge the extent of labor market segmentation by decomposing the earnings gap. Based on survey data from 1999-2000, Maurer-Fazio and Dinh (2004) conclude that 75.11% of the earning differential between urban and rural migrant workers can be explained by their differences in characteristics. Meng and Zhang (2001) find that 50.82% of the earnings gap is due to differences in characteristics. Utilizing the 2002 CHIP data, Deng (2007) regards 60% of the earnings gap as explainable. To put it in a nutshell, previous studies reached a consensus that labor market segmentation accounts for a significant portion of the earnings gap between urban and migrant workers.

Apart from labor market segmentation, the characteristics of rural migrants are generally less favorable than that of urban workers. It follows naturally that there exists an earnings gap between urban and migrant workers. For example, Meng and Zhang (2001) report migrant workers in Shanghai earn 50 per cent per hour less than urban local workers. Deng (2007) reports a similar pattern, which suggests that migrant workers earn 38 percent per hour less than urban local workers in 2002.

Previous studies mentioned above compare the earnings level of urban workers and migrant workers. However, the earnings differential within migrant workers, especially between migrants affected and not affected by natural disasters, remains unknown. Here, we use the 2002 wave CHIP data to shed light on this issue. From our data, we can find that migrants not affected by natural disasters enjoy a higher level of

earnings than migrants hit by natural disasters. The earnings of the former and latter are 4147 and 2974 Chinese *yuan*, respectively. As discussed earlier, some migrants affected by natural disasters are forced to move, while other migrants hit by natural disasters choose to migrate regardless of the occurrence of natural disasters. These two groups of migrants also differ in earnings levels. Those determined to move have a mean earning of 3373 Chinese *yuan*, although they are hit by natural disasters. However, since these migrants are forced to leave the countryside and not well prepared to move, those migrants have the lowest earnings among migrants, 2718 Chinese *yuan*.

Although migrants come to cities to make a better living, chances are that some of them might commit crimes if they cannot find a job, face extremely low earnings, and have a strong sense of relative deprivation. In this sense, migrants with little hope of making a living can be responsible for urban insecurity. It should be noted that the threat of migrants to urban security has been exaggerated. The mass media in cities often blame migrants for crime, violence, and chaos, although it misses the target in most cases. However, sparse evidence shows that migrants have some kind of relationship with urban insecurity. In Changsha, the capital city of Hunan province in middle China, the proportion of migrants of people committed crimes in 2000 is 61.43%, and increased to 82.24% in 2004 (Chen, 2007).

Clearly, migrants contribute significantly to economic growth in China. Thus, to foster urban security, keeping rural residents out of cities is not wise and applicable at all. But how to promote urban security with the growing number of migrants? Like western countries with well-developed welfare systems, social security can play an active role in promoting urban security in China. If social security programs are well-designed and effectively implemented, urban insecurity will not be an issue of importance, even in the case of increased migration driven by natural disasters.

Comment [DM1]:

The most relevant social security scheme to preserve urban security in the face of natural disaster would be a minimum living standard system. In China, such systems do exist and are called *Di Bao* programs. *Di Bao* programs are implemented in urban and rural China, separately. Migrants in cities are not entitled to apply for *Di Bao* even if their income is lower than the benefit level, simply because they do not have urban *hukou* (Gustafsson and Deng, 2007). Migrants are entitled to apply for *Di Bao* in their rural hometown instead. It is reported that at the year-end of 2007, 34.5 million rural residents received *Di Bao* benefit, increasing by 128.7% from 2006 (UNDP, 2008, pp.46). However, the *Di Bao* benefit enjoyed by rural residents is 63.77% lower than that of urban residents (UNDP, 2008, pp.67). Reforms on rural *Di Bao* programs, such as raising the benefit level, can have positive effects on promoting urban security. Besides the means-tested *Di Bao* program, other social insurance programs can also contribute to fostering urban security. For instance, unemployment insurance can help migrants pass through the hard times during unemployment. Medical and serious injury insurance program can compensate

migrant workers for losses in productive ability caused by disease and work injury. A pension program can help migrants develop an expectation of a stable life in cities. Needless to say, a social security system in China is far from full-fledged but reforms on social security system can boost urban security even with the increasing migrants.

Civil society can also play an active role in fostering urban security with more and more migrants flowing into cities. Civil society can help migrants have recognition of identity. Abandoning social exclusion from migrants is extremely important. By lessening or even eliminating discrimination against migrants, urban residents and rural migrants can maintain a harmonious relationship, which is conducive to urban security. To eliminate discrimination against migrants, differential treatment on work, social benefit, education of children, etc. should be abandoned.

5. Concluding remarks

This paper examined the effect of natural disasters, extreme events caused by gradual climate change, on urban insecurity, through the channel of rural-urban migration. Utilizing the 2002 wave of CHIP (China Household Income Project) data, this paper finds that natural disasters increase migration in a small magnitude. However, the structure of migrants changes significantly. Some rural residents are forced to move but would stay in the countryside had there been no natural disasters. Those forced to move due to natural disasters have the lowest earnings level in cities, compared to urban residents and other migrants. Chances are that migration driven by natural disaster may have an adverse effect on urban security. This paper then explored ways to foster urban security with the growing number of migrants, especially regarding reforms on social security system and strengths from civil society.

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