

# Impact of Rural-to-Urban Migration on Agricultural Commodity Inflation in China

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**Abstract:** Since the radical economic reforms initiated in the late 1970s, China, has been transformed from a stagnating socialist country into one of the world's biggest economies. However, the "invisible hand" of capitalism may not have succeeded in its magic without the 200 million workers who migrated from rural areas to the urbanized east coast. What are the implications of rural-to-urban migration on the agricultural sector, especially on recent sharp increases in food prices? On the basis of a survey of 150 individuals in 25 households in two villages of central China conducted in late March 2011, this paper explores the connection between the massive rural-to-urban migration movement and recent agricultural commodity inflation in China.

## **1. Introduction**

Both the *New York Times* and the BBC reported on April 15<sup>th</sup> of this year the rather staggering news that food prices in China rose 11.7 % in March 2011.<sup>1</sup> Inflation, especially food inflation, is probably the issue that ordinary Chinese worry most about these days. Since last year, agricultural commodity inflation has affected every corner of the country and signaled the tension between agricultural production supply and consumption. Various theories have been proposed to account for this inflation. According to the same news reports, the Chinese government said its economy had grown 9.7 % in the first quarter of this year (2011), the strongest performance among the world's biggest economies. Needless to say, economic growth alone can account for some increases in food prices. Other common theories include China's loose monetary policy, enormous government investment in large public projects, and China's undervalued exchange rate.

Although it is undoubtedly true that these factors have contributed to soaring food prices, there is another factor that has received much less attention, namely one of the largest rural-to-urban migrations in world history. China's 9.7 % economic growth in a single quarter could not have been accomplished without a labor force of 200 million Chinese migrant workers. Over the past 30 years, internal migration in China, including rural-to-rural and rural-to-urban migration has become the *de facto*—if not only—strategy used by rural households to improve their livelihood and to access non-agricultural employment opportunities. Needless to say, there is little doubt that this

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<sup>1</sup>BBC News Business, 15 April 2011, <<http://www.bbc.co.uk/news/business-13090135>>; David Barboza, "Fast Growth and Inflation Threaten to Overheat Chinese Economy," *New York Times*, 15 April 2011, <<http://www.nytimes.com/2011/04/16/business/global/16yuan.html>>

massive population movement has had numerous key effects on economic development patterns in China.

This study explores the impact of internal migration on recent dramatic changes in agricultural commodity prices. My initial hypothesis was that the decline in agricultural labor supply as a result of out-migration and the remittances sent home by migrants have together contributed to the increase in food prices. In the year 2009, more than 200 million Chinese rural migrants worked and lived in urban regions.<sup>2</sup> In 2005, migrants sent home the equivalent of US\$30.7 billion to their families in rural villages (Cheng and Zhong 2005). What is the connection between agricultural production and the seeming ever-increasing rural-to-urban migration flow? And what is the connection between the drastic reduction of the agricultural labor force and food inflation?

In this study, I collected and analyzed empirical and up-to-date data based on surveys I conducted in two rural villages in central China. In the surveys, I focused on the impact of remittances, as well as the different strategies that rural households have employed in response to the reduced labor force at the household level. By examining these household strategies and referring to published government economic data, I explore the resulting effects on the grain supply in China and its implications for agricultural commodity prices.

## **2. Background**

To understand patterns of economic development and other trends in China today, it is necessary to be familiar with the household registration system (*hukou* 户口 in Chinese) and the principal elements of the economic reforms of recent decades.

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<sup>2</sup> “Chinese Floating Population Development Report 2010 中国流动人口发展报告 2010.”  
<[http://www.gov.cn/jrzg/2010-06/26/content\\_1638133.htm](http://www.gov.cn/jrzg/2010-06/26/content_1638133.htm)>

## 2a. The Hukou System

In the 1950s, the Chinese government implemented the household registration (*hukou*) system in order to control population movement and, in particular, to prevent rural-to-urban migration. At this time, the Chinese government believed that heavy industry was the fastest way to catch up to the developed world, especially the U.S. and European countries. As a result, the government invested all available capital into the urban-based heavy industry sector, while using the agricultural sector as a source of raw materials. Because of the need to extract from the rural population, the government did not want to encourage a flood of migrants to China's urban areas, migrants who would be attracted by urban social benefits.

The *hukou* system was designed to confine people to their places of birth. Essential to the *hukou* system is the sharp division between rural and urban residents. Urban residents were assigned jobs by the state in the industrial sector; rural households were allocated agricultural land as a basis for supporting themselves. However, agricultural land is not owned by individuals, but collectively owned by villages or the state. Thus, villagers could not sell their land in order to relocate permanently to urban areas. Peasants were tied to their land and, with few exceptions, were forbidden to relocate elsewhere and acquire an urban *hukou*. Built into the *hukou* system in the early period was a food rationing system implemented to further restrict population movement. One could only obtain food ration tickets at one's place of origin, making it very difficult to survive away from one's birth place. This meant that, in the early years, rural-to-urban migration was essentially impossible (Zhao 2000).

Nowadays, the *hukou* system is still present though it is no longer as restrictive. Because rapid economic development in China depends on abundant and cheap labor, people with rural *hukou* are permitted to relocate freely to the cities. However, migrant workers are not entitled to any social benefits at their urban destinations, such as public education, medical insurance, and housing benefits. In some sense, the *hukou* system impedes migrants from permanently settling down in cities. Consequently, migrants strategically maintain strong contact with their places of origin as a place to which they may eventually need to return. For instance, it is very common for married migrants to send their children (as little as three months old through their teenage years) to the older family members back in the villages, where they are brought up and educated. Many scholars have pointed out that the *hukou* system has become a barrier to urbanization. As a result, the debate on whether or not the *hukou* system should be abolished for good has attracted considerable attention in recent years (Zhu 2007).

## 2b. Economic Reform

China's rural-urban divide and stagnating economy began to change at the end of the 1970s, when the new Chinese leader Deng Xiaoping adopted a series of radical economic reforms. These reforms culminated, in the early 1990s, with the opening of five special economic zones (SEZs) along China's southeast coast. In the five SEZs (Shenzhen 深圳, Shantou 汕头, Zhuhai 珠海, Xiamen 厦门, and Hainan 海南), the sudden soaring demand for cheap labor spurred waves of rural migrant laborers to relocate to eastern coastal cities. After adopting an export-oriented economic policy, the economic boom in China quickly spread to the entire Pearl River Delta. By the turn of the new millennium, economic prosperity had extended to the Yangtze River Delta as well.

In line with China's 30 years of fast economic development and growth, an ever increasing percentage of the rural agricultural population has moved semi-permanently to the economically advanced cities concentrated on the east coast (Fan 2008).

More recently, the Chinese government has strived to reduce further China's agricultural labor force, by diminishing the agricultural population from 500 million to 150 million. The plan is to speed up the urbanization process all across China, especially by expanding inland urbanization. Presumably, the out-migration of the rural population will only intensify. At the same time, the Chinese government has adopted a national strategy to deal with the problems of declining cultivated land, especially with regards to land dedicated to growing grain. In the 11<sup>th</sup> Five-Year Plan (2006), the Chinese government proposed a "red line" of 1.8 billion *mu* (120 million hectares) of cultivated land. This is believed to be the minimum amount of cultivated land that can still ensure "grain security" and the ability to feed China's 1.3 billion people.<sup>3</sup> It is nevertheless not quite clear what the end result will be.

### **3. Literature Review: Food Inflation and the Grain Supply in China**

Various theories have been proposed to link food inflation to grain supply and demand. Domestically, Chinese officials have argued that hot money has caused excessive speculation on certain agricultural commodities. Behind this reasoning is the idea that a new government policy restraining real estate investment (to avoid a bubble) forced speculators to invest their money in alternative markets, especially the agricultural commodity market.<sup>4</sup> The result has been a sudden inflation in the prices of agricultural

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<sup>3</sup> "Area of Arable Land May Drop Below Red Line." *China Daily*, May 17, 2007.  
<[http://www.chinadaily.com.cn/china/2007-05/15/content\\_872442.htm](http://www.chinadaily.com.cn/china/2007-05/15/content_872442.htm)>

<sup>4</sup> "Hot Money Speculation Drives up Prices of Agricultural Products." *CRIENGLISH.com*, Nov. 25, 2010.  
<<http://english.cri.cn/6826/2010/11/25/167s607014.htm>>

commodities. Internationally, distinct theories about grain inflation include that of Paul Krugman who has argued that global grain inflation has a lot to do with climate change which has caused droughts and floods (Krugman 2011). Another common explanation behind the food price spike involves the subsidized production of corn ethanol for fuel energy. This has prompted an increased global demand for grain crops, driving up prices worldwide.

The relation between migration and food inflation has attracted much less attention. However, there have been a few important studies. In 1995, Rozelle et al. conducted a case study involving 787 rural households from 31 villages in two provinces, Hebei and Liaoning. The authors found that labor migration had a negative effect on agricultural yield, whereas urban remittances (money sent home by rural migrants working in the cities) had a positive effect that partially compensated for the grain loss due to loss of labor.<sup>5</sup> The total net impact of migration and remittances on maize production per *mu* was negative. However, not all researchers accept the conclusion that labor out-migration has had a negative effect on grain yield. On the contrary, based on the 1995 National Bureau of Statistics (NBS) rural household income survey that covered 19 provinces and 8,000 households, Li (1999) observed that labor migration actually had a positive effect on rural agricultural productivity. Presumably, the loss of rural labor due to migration spurred remaining household members to work longer and more efficiently. Simultaneously, urban remittances freed household cash constraints on agricultural capital input (Ma et al. 2004). More capital investment made up for lost labor and allowed for greater productivity per unit area.

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<sup>5</sup> On average, one migrant results in the loss of 460 *jin* per *mu*. One migrant sends home 816 yuan per year. Every additional yuan increases productivity by 0.44 *jin* per *mu*. In total, one migrant's remittances, thus, increases productivity by 350 *jin* per *mu*.

Nonetheless, the assumption that remittances are reinvested in agriculture to improve productivity is challenged by Zhu et al. (based on a large sample of rural households from Jiangsu, Anhui, and Sichuan surveyed in 2001 and 2004 and representing the three regions of Eastern, Central, and Western China, respectively) and by Murphy (who conducted a survey of 138 rural households in Wanzai county, in northwestern Jiangxi Province). Both have strongly argued that urban remittances have almost no effect on agricultural yield, being primarily allocated for basic consumption and livelihood of rural households instead of being reinvested to improve agricultural productivity. One of the reasons is that peasants lack incentives to make a big investment to improve land productivity because land is not owned by individual peasants but collectively by the village. Consequently, land is subject to reallocation after demographic change, such as marriage, birth, and death.

In addition, Hong Yang argues that there is a negative relationship between non-grain income and household grain productivity. With an increase in the share of non-grain income, farmers devote less time to grain cultivation. Hong Yang's argument matches Bai Nangsheng's empirical finding. Based on Bai Nansheng's 1994 empirical study of 2820 rural households, in low cash income households, agricultural productivity has yet to reach its full potential due to a lack of cash to purchase basic agricultural inputs such as seeds, chemical fertilizers, and pesticides. With the receipt of urban remittances, grain output per *mu* increases due to a loosening of cash constraints. On the contrary, agricultural productivity becomes satiated in high cash income households, which are able to purchase necessary agricultural input even without urban remittances. For similar reasons, migrant households sell less grain to market than non-migrant households,



especially in the case of middle and high income families. This result is tremendously significant. It implies that as China's rural population becomes wealthier, this may lead to a decline in the supply of agricultural commodities.

Finally, some scholars have taken environmental factors into consideration when determining the impact of migration on the overall grain supply. Davin argues that migration has not affected production yield despite the increase in fallow land because China is to begin with a country with land shortages. She also argues that when marginal land or less productive land goes out of cultivation and returns to the wild, this is a positive outcome for society. In the past, due to huge population pressures, the good cultivated land and the marginal cultivated land have both been over-cultivated, leading to soil erosion and a decline in soil fertility (Davin p.81). Thus far, scholars seem not to have reached a consensus on the impact of migration and remittances on rural agricultural productivity, especially regarding the overall grain yield.

#### **4. New Methodologies**

I propose that ambiguous findings on the effects of migration and remittances on grain yield are the result of the assumptions that underlie the approaches used by most scholars studying rural China. In particular, there is a strong tendency for researchers to treat China's rural areas as homogeneous. Assuming that China is homogeneous is convenient when initially creating a model for rural society. Subsequently, the oversimplified model needs to be complicated to differentiate specific variables that contribute to agricultural production yield. There are three specific geographic and socioeconomic variables that need to be distinguished.

First, it is important to distinguish coastal rural society from inland rural society. For instance, past studies have grouped Guangdong and Sichuan, and Fujian and Hebei Provinces together without exploring how province-specific characteristics affect labor out-migration and subsequent remittances (Li Shi 1999; Zhu Yu 2007). The rural areas of Guangdong and Fujian Provinces are generally wealthier and have easier access to advanced economic urban areas, in contrast with the poorer inland rural areas of Sichuan and Hebei. The geographic and socioeconomic differences between coastal rural and inland rural areas result in entirely different migration patterns and migrant compositions. This is best illustrated in Li Shi's (1999) observation that, in Guangdong province, primarily people from the poorest rural households migrate out, whereas in Sichuan province, it is largely the middle-level rural households that produce migrants. Whether the majority of migrants come from the poorest rural households or middle-level rural households can have very different consequences on agricultural grain yield.

Second, it is necessary to pay more attention to the differing socioeconomic compositions of migrants when assessing the precise impacts of out-migration and remittances on rural agricultural yield. Bai Nansheng has introduced this approach in an important study conducted in 1994 and 1995. Bai surveyed 2820 rural households in four counties from Anhui (1000 households) and Sichuan Provinces (1820 households), further dividing rural households (both migrant households and non-migrant households) into three clusters based on their cash income levels: low cash income, middle cash income, and high cash income. In the end, although Bai concludes that migration "at the current scale has not caused significant disruptions to agricultural production," he observes that labor out-migration had a positive effect on grain yield in the case of low

cash income households; and had a negative effect on grain yield in the case of high-cash income households. Looking for both inter-provincial variation and variations between different socioeconomic groups makes Bai's model particularly effective; more studies in the future should be conducted along these lines.

But even Bai disregards a third important factor that determines the impact of migration and remittances on agricultural yield: intra-regional geographic variations. I propose that the impact of migration and remittances will differently affect farm land in mountain valleys from land in flat plains. In Bai's study, he selects four counties from two provinces. Examining these counties using Google maps reveals that they are quite different in geographic features. The selected two counties in Sichuan (Renshou 仁寿 and Quxian 渠县) consist largely of mountainous and hilly land that is not suited for tractors and that leads to less arable land per capita. By contrast, the selected two counties in Anhui province (Yingshang 颍上 and Zongyang 枞阳) consist of flat plains and semi-mountainous terrain. Whether or not it is possible to utilize tractors as a substitute for lost labor due to migration, and whether or not it is possible to consolidate the land of out-migrants to produce economies of scale will both determine the impact of migration on agricultural productivity. Theoretically, the flat county in Anhui (Yingshang 颍上) should become more productive as agricultural surplus laborers free up land and send money home that can be invested in tractors. Unfortunately, Bai does not include data from Anhui in his final output model because he did not have access to data that would allow him to distinguish between agricultural revenues in order to group households into socioeconomic categories. In the selected two counties in Sichuan for which he does have data, the terrain is mountainous and hilly. I suspect that the fact that Bai focuses only on

mountainous counties partly explains why his conclusions are not entirely in line with those of other studies.

Besides new methodological approaches, it is also crucial to collect up-to-date empirical data in order to gain a relatively accurate picture of a country that is in the midst of extremely rapid socioeconomic change. In the past 10 years, China has joined the WTO (in 2001), abolished rural agricultural taxes (in 2005), and hosted two major international events, the 2008 Summer Olympic games and the 2010 Shanghai World Expo. In addition, throughout this period, China had maintained an economic growth rate of 10% or more per year. Furthermore, rural net per capita income has doubled twice since the year 1995. As a result, it is important to reevaluate the impact of migration on agricultural production, and produce a new model to understand its impact on food inflation.

## **5. Data**

My field work was conducted in two villages during the ten day period from March 18 to March 27, 2011. The two villages lie in two different provinces in the central part of China, Anhui Province and Jiangxi Province (see Figure 0 for map). Both provinces are two of the largest suppliers of migrants to the economically advanced coastal cities. Moreover, both provinces enjoy favorable climates that permit two harvests a year; thus, the agricultural sector is the main source of revenue for the provincial economies. Due to my limited resources and time, I selected two villages as my subjects on the basis of my personal connections. The two villages had different geographic and topographic features affecting agricultural production, thus permitting me to evaluate the impact of intra-provincial geographic factors like terrain on how migration affects the

grain supply. One village contains hilly and dispersed land (village B, Jiangxi Province) and the other village has relatively flat and concentrated land (village A, Anhui Province) (see Figure 1 for photographs). The analysis in this study is based on my survey of 12 households in one village group (zu) in village A in Anhui Province, and of 13 households in village B in Jiangxi Province. In total, the 25 households included 150 individuals.

Village A is situated in the western part of Anhui Province. It is located two kilometers south of Hanting Township 寒亭镇, and 18 kilometers west of Xuancheng City 宣城市. The road from village A to Hanting is not yet paved. Villagers either walk or ride motorcycles to the Hanting market. From Hanting to Xuancheng, by contrast, there is a paved highway that allows for travel times of less than 20 minutes by bus. According to the 2008 Hanting Township records, the average net per capita income in village A is 6473 *yuan* per year, which is much higher than the Anhui provincial and the national average (4763 *yuan*).<sup>6</sup> Village A has 36 groups with a total population of 2391 people. It has 3700 *mu* of arable land and 2000 *mu* of hill land (山场) (Figure 2). On its web page, the township is proud to assert that there are 19 households that plant over 100 *mu* of rice. Because the hill land is not cultivated, this village is an example of a farming village located in the flat plains.

Village B is situated in the southwest of Jiangxi Province. It lies in a remote and mountainous region that is located 60 kilometers southwest of the seat of Anfu 安福 County. It epitomizes the type of village that lies in mountainous terrain. Travel from the county seat to the village takes about 70 minutes by mini bus. Despite its remoteness,

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<sup>6</sup> Hanting Township Xuancheng District government web page 宣州区寒亭镇人民政府网, 4/15/2011, <http://www.xuancheng.gov.cn/XzHtz/index3.aspx?ResourceId=6598>

the road to village B was paved three years ago. According to the 2008 county records, the average net per capita income in village B is 3817 *yuan* per year, which is about equal to the provincial average.<sup>7</sup> Village B, with a population of 991 individuals, consists of 4 groups and 194 households. Because it is surrounded by mountains, the village has 26762 *mu* of forested land. By contrast, its 460.5 *mu* of arable land is meager, and includes 432 *mu* of irrigated paddy fields, and 28.5 *mu* of dry fields (Figure 2). Two years ago, the forested land was divided up among individual households (8.4 *mu* per person), who now have complete autonomy on how to use the land, making decisions that once had to be made by the community. After the allocation of forested land, each individual in every household of village B received a lump sum of 12,000 *yuan* from a large lumber company in exchange for the company gaining the right to sell all usable lumber. In subsequent years, villagers will be responsible for managing their own forested land by planting whatever they wish to plant.

#### 5a. Questionnaires and Interviews

In village A, I interviewed 12 households, generating data on a total of 53 people in the 12 households. In village B, I interviewed 13 households, generating data on a total of 97 people in the 13 households. The interviewees provided descriptive information on all family members. It should be noted that with almost the same number of surveyed households in the two villages, the household size appears to be double in village B. I have come to realize that the large difference between the sizes of households between these two villages has to do with the fact that interviewees held different views on whom to count as a member of the household. In village A, interviewees were primarily male in

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<sup>7</sup> Anfu county government web page 安福县人民政府网, 4/15/2011, [http://pub.jian.gov.cn/jxaf/bmgkxx/xtjj/gzdt/tjsj/200908/t20090814\\_221886.htm](http://pub.jian.gov.cn/jxaf/bmgkxx/xtjj/gzdt/tjsj/200908/t20090814_221886.htm)

their 40s to 60s, who as the head of household reported their children and household members, but not their siblings. By contrast, due to circumstances of the interviews, in village B, many of my interviewees were elderly females (50-65 years old). These women included all their adult children and grandchildren as their household members. This bias does not have a significant effect on my analysis. See Appendices I and II for two case examples of individual households. See Appendix III for an English translation of the questionnaire used for the survey.

## **6. Results and Analysis**

### **6a. Migration Trends and Household Incomes**

Figure 4 presents basic data on out-migration in the two villages. In village A, 31% of the total labor force—that is, males and females between the ages of 16 and 70—has migrated out to an urban area to work in non-agricultural activities. In total, two thirds of households have one or more family members who have migrated out (data not shown). Among the remaining one-third of households, all but one has had a family member who has lived in an urban area at some time in the past. As shown in Figure 3, 61.5% of migrants from village A work and live in nearby urban areas in Anhui Province, mostly in the three cities of Hefei 合肥 (the capital of Anhui Province), Wuhu 芜湖, and nearby Xuancheng 宣城. Only 38.5% of migrants from village A work outside the province. The average yearly remittances sent home to the family from the city is 2717 *yuan* per migrant.

In village B, the rate of migration among males and females of working age is 56.6%, almost double that of village A (see Figure 3). Moreover, a strikingly high 84.6% of households have one or more family members who have migrated out to the city.

Among migrants from village B, 90% have left the province, going mostly to Zhejiang 浙江, Fujian 福建, and Guangdong 广东 Provinces. The average yearly remittance is 2689 *yuan* per migrant.

This data leads to two important observations. First, the migratory patterns of the two villages are entirely different: village A is dominated by intra-provincial migration, whereas most migrants from village B have left the province. This migration pattern reveals that local provincial development in Anhui Province may be more robust and promising than in Jiangxi Province. Other factors, by contrast, are quite similar between the two villages. The average age and education of migrants are similar in these two villages. As shown in Figure 4, the average age of migrants is about 29 years old, and the average schooling of migrants is about 8 years (middle school level). The migration participation rate is conspicuously higher than the maximum rates of migration recorded in the 1990s (25%).

Second, remittances do not seem to play as important a role as in the 1990s. During my field work, it was somewhat difficult to get unambiguous answers regarding household income. For example, in village A, people would say that their income is “over 10,000 *yuan* 万把块钱.” This ambiguous statement could mean anywhere between 10,000 and 20,000 *yuan* per year. In general, peasants either do not know or are reluctant to report their exact family revenues. Thus, I calculated average family revenue by using Hanting and Anfu government data. The average family revenues are 25,892 *yuan* in village A and 15,268 *yuan* in village B. These estimated official figures more or less correspond to the ambiguous figures that households reported in the surveys. On the basis of these figures, one can calculate that remittances consisted of 10.5% and 17.6% of the



average family revenues in village A and village B, respectively (see Figure 5). Because migrants usually send their children back to their places of origin to be brought up by their grandparents, one of the main purposes of remittances nowadays is to cover childcare expenditures. According to an informant who is taking care of a 5 year-old granddaughter, she spends at least 200 to 300 *yuan* per month on the girl. Thus, annual remittances of 2717 *yuan* approximately covers childcare costs. Remittances do not represent extra sources of revenue; they cannot be reinvested in agriculture and so play little to no role in household decisions regarding agricultural production.

#### 6b. Household Agricultural Production Strategies

Villages A and B employ different strategies in response to the reduced labor force at the household level brought about by out-migration. The main strategies consist of: 1) hiring labor during the agricultural peak season; 2) renting one's allocated land out to tenants; 3) substituting machine power for human labor; 4) allowing land to lay fallow (a strategy only employed in village B).

In village A, all informants complained of the labor shortage during the agricultural peak season, when planting or harvesting of the rice had to be completed on all the land in the village in a narrow window of time of between one and two weeks. To resolve the labor shortage, some villagers hire day laborers. However, because of the shortage of labor during the peak period, the cost of hiring labor is very high (100 *yuan* = \$ 15.38 dollar/day) and has, over the past few years, been increasing by 10 to 20 *yuan* per year. A second solution is for peasants to rent out their land to neighbors or relatives who have a larger household labor force. The process is arranged informally through an oral promise and involves compensation in kind (200 to 250 *jin* of rice per *mu*) or in cash (100

to 300 *yuan* per *mu*). Many informants complained that there is no net profit in farming rented land, especially when this land is not contiguous with their other holdings. However, because of the belief that it is necessary to work the land each year in order to keep the soil in good shape and the irrigation channels well maintained, they reluctantly agree to farm the extra land as a favor to their neighbors or relatives.

In the case of five households, the families rent out their paddy land usually for 200 *yuan* per *mu* and then themselves farm large tracts (e.g. 50 *mu*) of land they rent from a former state farm near the village. Renting land from the state farm is more expensive than renting land from other villagers, costing from 300 to 460 *yuan* per *mu*. However, farmers are willing to pay more because of the good irrigation system, good roads, and the possibility of farming large tracts of contiguous land. When farming non-contiguous fields, most households can manage only about 15 to 16 *mu* due to the time-consuming and labor-intensive farming practices. There is a notable contrast between farmers who complain of low profits versus the peasants who rent land from the state farm and seem relatively content with their profits and work loads.

Third, the use of mechanized agriculture is widely practiced in village A. Generally, villagers say that they are happier and have an easier life than 10 years ago, because the majority of the plowing and harvesting is done by machine instead of manual labor. In village A, peasants have been using machines for five to six years. No one now uses buffalos to plow their land or hand tools to harvest rice plants except near the borders of the fields, in places that the machines have trouble accessing. This is one reason that it is so much more time consuming to cultivate non-contiguous fields.

In the case of village B, nearly every member of the younger generation who can find non-agricultural jobs has migrated out, mainly to destinations outside of the province. The migration is so vast and unprecedented that the entire young adult generation (those aged 20 to 40) are absent from village B. One only encounters the older generation and young children whose parents work and live in urban areas and have sent their kids home to live with the grandparents. The villagers who remain resort to two strategies to deal with the labor shortage: 1) shifting from double-cropping to single-cropping; 2) allowing less fertile and marginal land to lie fallow.

In village B, the traditional agricultural practice has been to grow two crops of rice per year. In the past six or seven years, most villagers have shifted from double-cropping to single-cropping due to the drastic reduction in the labor force at the household level because of out-migration. Cultivating two rice crops on a single plot demands intensive labor because of the overlapping need to prepare the fields, transplant the second rice crop, and harvest the first rice crop roughly at the same time. It is especially difficult since this work is done entirely with manual labor. Since timing is so critical for both harvesting and planting, all this work has to be completed in one or two weeks, a period of time called in Chinese “robbing the season 抢季节.” It is not surprising to observe that there are now only two surveyed households that continue the traditional practice of farming two rice crops per year.

In addition to the very recent trend in favor of single-cropping, it is very common in village B to allow a portion of one’s allotted land to lie fallow. Without exception, all households farm less land now compared to 10 years ago. The possibility of renting one’s land out to neighbors is low for three reasons. First, villagers claim that there is no profit

in farming others' land due to the lack of labor at the household level. Second, villagers are content to farm their own paddy land to produce just enough food to satisfy household needs. Third, the possibility to hire labor or seek help from relatives is almost non-existent because every household faces the same problems. Thus, because renting out land is impossible, many villagers who migrate out to the cities are happy to have someone farm their land rent free. As in the case of village A, villagers do not like to allow weeds to take over their land, because they fear this will reduce the quality of the soil and turn the "cooked land" into "raw land." Over the past few years, villagers have almost entirely abandoned more marginal land, including land that is difficult to irrigate and land too close to the hills that is susceptible to damage by wild boars living in the forests. The result is that, although village B has relatively little arable land to begin with, each household has reduced the land they farm to only two to three *mu*, about half of their total allocated land. Given that villagers have also begun to single-crop, the net village grain yield is less than half of what it was a few years ago.

#### 6c. Increases in Agricultural Production Cost

One of the striking consequences of the strategies employed in village A is the drastic increase in agricultural production cost. In village A, the average rice production cost is 741 *yuan / mu*. In contrast, the average production cost is only 190 *yuan / mu* in village B. The difference between the two (551 *yuan*) is very significant. The average grain output in village A is 1450 *jin per mu*, whereas it is 707 *jin per mu* in village B (see Figure 6). It should be remembered that rural households only plant one rice crop in village B versus two crops in village A. Thus, the grain productivity would be similar if

village B farmed two crops instead of one crop. Nevertheless, the production cost is much higher in village A due to the substitution of labor with machines and the land rental fee. For example, it costs 75 *yuan* to hire somebody to plow one *mu* of land with a mechanized plow. Households farming large tracts of land own their own plows, but still face 25 *yuan* per *mu* in fuel costs. Another labor-machine substitution involves harvesters; it costs 60 *yuan* per *mu* to rent such a machine and pay the wages of the operator. Transporting the harvested rice grain from the fields back to one's home costs another 10 *yuan* per *mu* (see Figure 7). All these fees are subject to annual increases.<sup>8</sup> Another big production cost lies in the rent of the land, whether it is rented from other peasants or from the state farm. The land rental fee ranges from 200 to 460 *yuan* per *mu*. If one uses village B as a baseline, doubling the production cost in village B to take into account the double-cropping in village A, one can come up with an estimate of the production cost increase in village A:  $741/380 - 1 = 95\%$ . In other words, production costs have roughly doubled after machine-labor substitution. It should be noted that, despite these increases in costs, productivity per unit of land has not changed for at least five years according to the survey data from both villages A and B.

None of the above production input costs apply to village B, where different strategies have been taken in response to the reduction in the labor force. In village B, rural households still use oxen to plow their land and employ intensive human labor to prepare the rice field, transplant young rice plants, and harvest the rice grain. This is the traditional farming method that has existed for thousands of years. The principal reason machines are not used is that the fields are small and the terrain is uneven, thus making mechanized agriculture particularly inefficient. In other words, terrain has had an

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<sup>8</sup> The fee to use a harvester, for example, has been going up 10 *yuan* per year.

important impact on peasants' decision-making. The advantage of the traditional farming method is that the input cost is reduced to a minimum. Peasants in village B report that the total production cost of one *mu* ranges from 120 to 300 *yuan* (average of 190 *yuan*), including fertilizers, pesticides, and seeds. Regarding agricultural productivity, rural households in village B could produce an equal amount of grain output per unit land as in village A if they farmed two crops per year. The labor-machine substitution has had little impact on land productivity, but has enormously increased rice production costs.

## **7. Conclusion**

One unexpected result of the survey is that remittances seem relatively insignificant as a percentage of household income. Although there is good evidence in earlier surveys conducted in the 1990s that remittances did affect agricultural production decisions, it seems that remittances have not increased in recent years at the same pace as rural incomes. Remittances now seem to be absorbed almost entirely in childcare costs.

On the other hand, the decline in the agricultural labor force due to out-migration has had an important impact on production decisions. As hypothesized, decisions did depend on terrain features. In mountainous regions (i.e., village B), the agricultural grain yield decreased by more than half as villagers switched from double-cropping to single-cropping, while simultaneously allowing the less fertile and marginal land to lie fallow. On the other hand, in flat regions (i.e., village A), labor shortages led to labor-machine substitution and the farming of large tracts of land rented from other villagers or from the state. This trend has nearly doubled production costs in village A.

How might these trends have contributed to food inflation? According to "China Yearly Macro-Economics Statistics," based on data available on the webpage of China's

National Bureau of Statistics, the national grain yield in 2006 was 49804.23 units of 10,000 tons. By using the data from the *China Rural Household Survey Yearbook 2007*, one determines that the mountain regions produced a total grain yield of 10818 units of 10,000 tons. Thus, the percentage of the mountain region grain yield relative to the total national grain yield was 21.7% (10818/49804.23 units of 10,000 tons) in the year 2006. If one assumes that Village B is typical (a larger-scale survey would need to confirm this fact), then one can assume that all mountainous farm land has decreased its total grain yield by at least half. This would mean that the total national grain yield will have decreased by about 10 % (21.7% \* 50 %) since 2006.<sup>9</sup>

Another important finding involves the systematic relocation of young and better educated adults from villages to urban areas. Many researchers describe rural-to-urban migrants as “surplus labor.” Given the ubiquitous complaints of labor shortages in the countryside, it is worth noting that migrants from the two surveyed villages were attracted to the cities more because of greater income earning opportunities than because they constituted “surplus labor.” The departure of young adults is important for other reasons as well. Based on my interviews, it appears that the older generation remaining in the villages hold a “subsistence mentality.” In other words, most older farmers are content to generate enough food for their household needs. This is why the villagers in village B do not appear interested in growing low maintenance cash crops for the market. According to my informants, there is one younger male (about 35 years old) in village B who has returned from the city to grow wild mountain camellias in order to produce highly valued camellia oil (a special local product). He is exceptional in the village.

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<sup>9</sup> Note that it is difficult to confirm this decline based on data collected by China’s National Bureau of Statistics because of what appears to be a systematic tendency by county officials to underreport any declines in revenue or cultivated land.

Similarly, in village A, the head of household of the five households who have rented out the large 50 *mu* tracts of state land are also young (30 to 45 years old). The general shortage of the younger generation in the two villages has prevented more people from taking risks of this sort.

The labor shortage has also allowed local rural laborers to find temporary jobs, which peasants refer to as “doing small work 打小工.” These jobs include house construction, road maintenance, picking tea leaves, and cutting lumber. The availability of such jobs further decreases the incentive to work in the fields, especially in cases where farming yields little net profit. The possibility of increasing rural household income through various temp jobs probably has a negative effect on agricultural yield. According to the *China Rural Household Survey Yearbook 2008*, rural household incomes have doubled in the decade between 1995 and 2005. Even more dramatically, the rural personal income has increased by 59% in the three years from 2005 to 2008 (see Figure 9). Moreover, according to the *Poverty Monitoring Report of Rural China*, data collected by the Rural Survey Department of the National Bureau of Statistics, the higher the income level of rural households the higher their migration tendency (see Figure 10). Rural salaries have been increasing, which leads to more out-migration. I suspect that this will further accelerate the rate of increase of agricultural commodity prices.

What is the overall impact of out-migration on grain prices? According to the *China Rural Household Survey Yearbook Vols.2002-2010*, grain prices have increased 59% from 2002 to 2008, and another 10% from 2008 to 2009. The factors I have explored involve supply-side factors only. As I have not examined demand-side factors, it is difficult to tell what component of these price increases is due to factors related to out-



migration. The surveys conducted for this study, however, suggest that the total grain supply may have decreased by 10% in recent years, while production costs in much of China have doubled. It seems likely that these changes have played a role in grain price increases.

Further research remains to be done. A much larger survey that examines other grains besides rice needs to be conducted. It is also necessary to pay more attention to demand-side factors. Finally, it will in the future be necessary to take note of the effects of new government policies designed to encourage inland urbanization.

**Appendix I. Individual Case:** Village A, Household #3

Interviewee: Mr. Mei, male, 55 years old, has never attended school

## a) Household Basic Description

Mr. Mei is the head of household and has never migrated out, continuously farming in village A. Like him, his wife is 55 years old and has never attended school or migrated out. They have two daughters. Both are married. The second daughter now is 28 years old and has married uxorilocally. Both his second daughter and son-in-law work and live in nearby Wuhu County, Anhui Province. They have a 5 year-old son who lives with his grandparents since he was seven months old. Mr. Mei reports a total of five members in his household.

The household has five *mu* of rice paddy land. On top of that, Mr. Mei rents 10 *mu* of land from his two brothers who have migrated out to urban areas as migrant workers. He has verbally promised to pay 250 *yuan* per *mu* a year.

## b) Agricultural Production and Its Problems

The household cultivates two rice crops a year. Mr. Mei harvests 600 to 700 *jin* per *mu* from the first crop and 800 *jin* from the second rice crop. He cultivates more land than five years ago because much land is vacant due to out-migration. He farms only an additional 10 *mu* of fertile land because that is the limit of his physical abilities. He claims that there is only a tiny net profit from farming and thus he does not want to rent land this year because it is not worth it. One big problem lies in the household labor shortage. During the agricultural peak season, he alone has to manage all the difficult manual work of plowing, harvesting, and transplanting the young rice shoots. His wife has to manage the housework, livestock, and, more importantly, takes care of the 5 year-

old grandson. Seeking help from relatives, neighbors, and friends is impossible since every household is short of hands. Thus, it is difficult to hire labor even at a very high labor cost. He asserts that the village has a bit of marginal land that is now left fallow due to poor irrigation and the absence of roads for bringing in tractors. He complains that the land he cultivates is discontinuous. Other things that worry him are the high input costs and the irrigation problem.

#### c) Income and Livelihood

When I asked about the household yearly income, he gave me a rather ambiguous figure: a “little over 10,000 *yuan* 万把块钱.” This ambiguous answer could mean anywhere from 10,000 to 20,000 *yuan*. He has a two-story house that is made half of wood and half of concrete and steel. He has a well for drinking water and uses a stove attached to a gas tank for cooking food (though occasionally the wood-fuel stove is also used). He is satisfied and content about his current rural life. Last year, his son-in-law had a severe illness and had a big operation. Thus, he claims that he alone has to support five people.

#### d) Migration and Remittances

The two daughters migrated out when they were 16 years old. Before their marriages, they sent 2000 to 3000 *yuan* per year back home. However, the elder daughter stopped sending money after she got married. The younger daughter sends 2000 *yuan* for the expenditure associated with her 5-year-old son. The married couple works in Wuhu County and earns a 2000 *yuan* monthly salary.

**Appendix II. Individual Case: Village B, Household #14**

Interviewee: Mrs. Peng, female, 52 years old, has two years of schooling

**a) Household Basic Description**

The head of the household is 54 years old. In total, the household has 12 people, including 3 sons, 3 daughters-in-law, and four grandsons. All three sons and their wives have migrated to Guangdong Province. The elder son and his wife (from Sichuan Province) work in construction in Huadu 花都, Guangdong Province. The second son and his wife (from Xinyu 新余, Jiangxi Province) work in a factory in Shenzhen. The third son and his wife (from Henan 河南 Province) work in a factory as security guards in Shenzhen. Mrs. Peng takes care of three grandsons. The eldest grandson, previously also cared for by Mrs. Peng, has since returned to live with his parents in Huadu.

**b) Agricultural Production and Its Problems**

The household has 6 *mu* of rice paddy land. In the past five years, they only cultivate three *mu* of fertile land and have allowed the three less fertile *mu* of land to lie fallow, since this land is difficult to irrigate and has problems with wild pigs damaging crops. The household farms one rice crop a year, generating enough food for self-consumption. Mrs. Peng claims that they cultivate much less land because of a lack of labor at the household level.

**c) Income and Livelihood, Migration and Remittances**

The household has a two-story house that was built eight years ago. The family income is primarily from remittances. The eldest son sends only 800 *yuan* per year now, since his son is no longer cared for by Mrs. Peng. The second son sends 600 *yuan* per month because his two sons are living with the grandparents. The third son sends 500

*yuan* per month for the expenditures incurred by his kid. The three sons and their wives come back once a year during the traditional Spring Festival.

**Appendix III: Questionnaire (English translation)**

This questionnaire is part of an academic research project for an undergraduate honor's thesis. It aims to investigate the relationship between migration and grain yield in rural China. The outcome of the questionnaire certainly has precious research value on China's agricultural production and internal migration.

Thank you very much for your courtesy and cooperation!

Respondent Name(optional):

Age:

Occupation:

Gender:

Education:

Origin (Province, County,

Township):

1. How many people are in your household? Who are they?
- 2.a) Has any member of your family lived outside of this village in the last 10 years? 1) Yes      2) No
  - b) Gender?      1) Male      2) Female
3. His/her relationship with the head of household?
4. a) How old was he/she when he/she left the village? Age:
  - b) When was he/she born?
5. His/her marriage status? Single; Married; Divorced; other(specify); Don't know
6. How many years of education has he/she had? \_\_\_\_ Years
7. a) Where did he/she go? 1) Other village      2) other county      3) other province
  - b) What kind of place? 1) Village      2) town      3) City
  - c) The reasons he/she left the village (choose the three most important reasons in order)
 

Unemployment	Poor income
For education	Marriage
Join other family members	To do business
Better income	other (specify)
- 8.a) Has he/she ever sent money back? 1) Yes      2) No

- b) How much has he/she sent back per year (in yuan)? under 1000; 1001-2000; 2001-3000; 3001-4000; 4001-5000; 5001-6000; 6001+
9. How much does he/she earn per month? under 1000; 1001-2000; 2001-3000; 3001-4000; 4001-5000; 5001-6000; 6001+
10. Who recommended that he/she go there? 1) neighbors 2) relatives 3) friends 4) self 5) others (specify)
11. How many times does he/she come back in a year? 0, 1, 2, 3 +
12. What is the main revenue in your household? 1) farming 2) sideline (husbandry, etc) 3) salary 4) remittances 4) other(specify)
13. How many *mu* does your household farm?
14. Has his/her absence affected your household's agricultural production? 1) Yes 2) No 3) Don't know
15. a) Have there been any changes over the last 10 years? 1) Same 2) Farming more 3) Farming less 4) Don't know
- b) Do you know the reasons for these changes? 1) Yes (specify) 2) No
16. Describe your household's annual agricultural output over the last five years?
17. a) Regarding agricultural yield, have there been any changes over the last 10 years? 1) same 2) yield more 3) yield less 4) Don't know
- b) Do you know the reasons for these changes? 1) Yes (specify) 2) No
18. How much is the agricultural production cost per *mu*?
19. what was your household's total income last year?

#### Appendix IV: Chinese Measures

1 *jin* - 0.5 kilogram

1 *mu* - 0.165 acres

1 *yuan* - 6.5 dollar (Mar. 2011)

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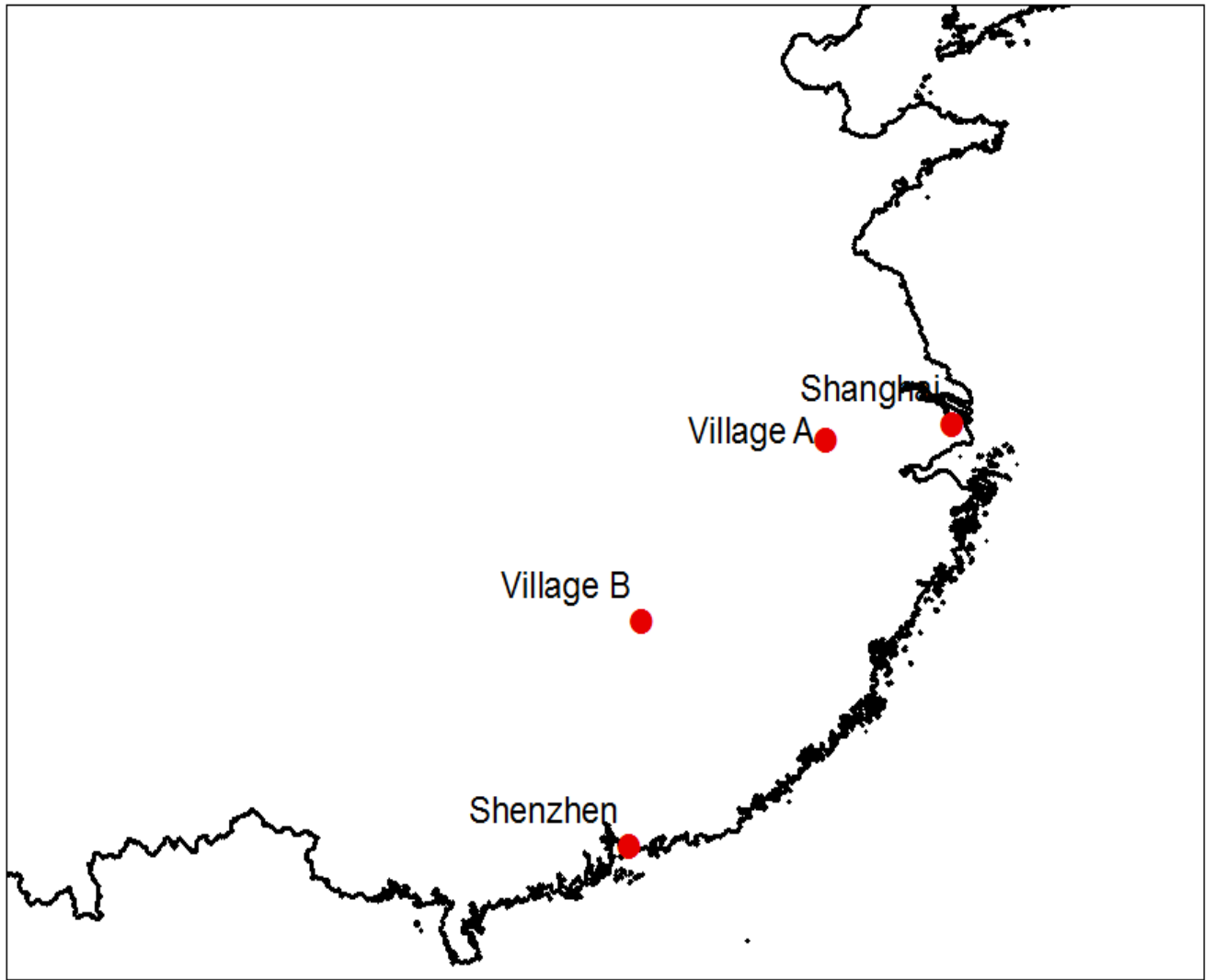
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**Figure 0. Map: Locations of Villages A and B**



The locations of village A and village B relative to two big east coast cities, Shanghai and Shenzhen.

**Figure 1. Photographs of Villages A and B**

Village A : Flat Land (author's photo)



Village B: Mountainous Land (author's photo)

**Figure 2. Basic Data on the Two Villages**

	Village A	Village B
Number of Households	485	194
Population	2391	991
Annual Income per Capita ( <i>yuan</i> )	6473	3876
Cultivated Land per Person ( <i>mu</i> )	1.6	1.2
Cultivated Land ( <i>mu</i> )	3700	460.5

Sources: Web pages of county governments. See footnotes in main text.

**Figure 3. Migrant Destination**

Village	Intra-Provincial	Out of Province
A	61.5% (8/13)	38.5%(5/13)
B	9.3% (4/43)	90.7% (39/43)

Source: Author's survey of village A and village B.

**Figure 4. Basic Data on Migrants**

Village	n	Age	Education	% Female	% of Total Labor Force
A	13	29	9	30.8%	31% (13/42)
B	43	30	8	43.5%	56.6% (43/76)

Source: Author's survey of village A and village B.

**Figure 5. Annual Household Incomes and Annual Remittances**

Village	Income	Remittances	Remittances as % of Income
B	15,268	2689	17.61%
A	25,892	2717	10.49%

Source: Average household income is estimated using data on per capita income taken from the web pages of the county governments. Per capita income is multiplied by 4 (the average size of a household) to obtain household income. Value of remittances comes from authors' survey.

**Figure 6. Grain Output and Grain Production Cost**

Village A: Grain Output & Grain Production Cost					
	n	Mean	Std.Dev.	Min	Max
Grain Output ( <i>jin</i> )	12	1450	487	0	1800
Grain Production Cost ( <i>yuan</i> )	12	741.66	277.8	0	1000

Village B: Grain Output & Grain Production Cost					
	n	Mean	Std.Dev.	Min	Max
Grain Output ( <i>jin</i> )	13	707	415	0	1400
Grain Production Cost ( <i>yuan</i> )	13	190	121	0	400

Source: Author's surveys of village A and village B.

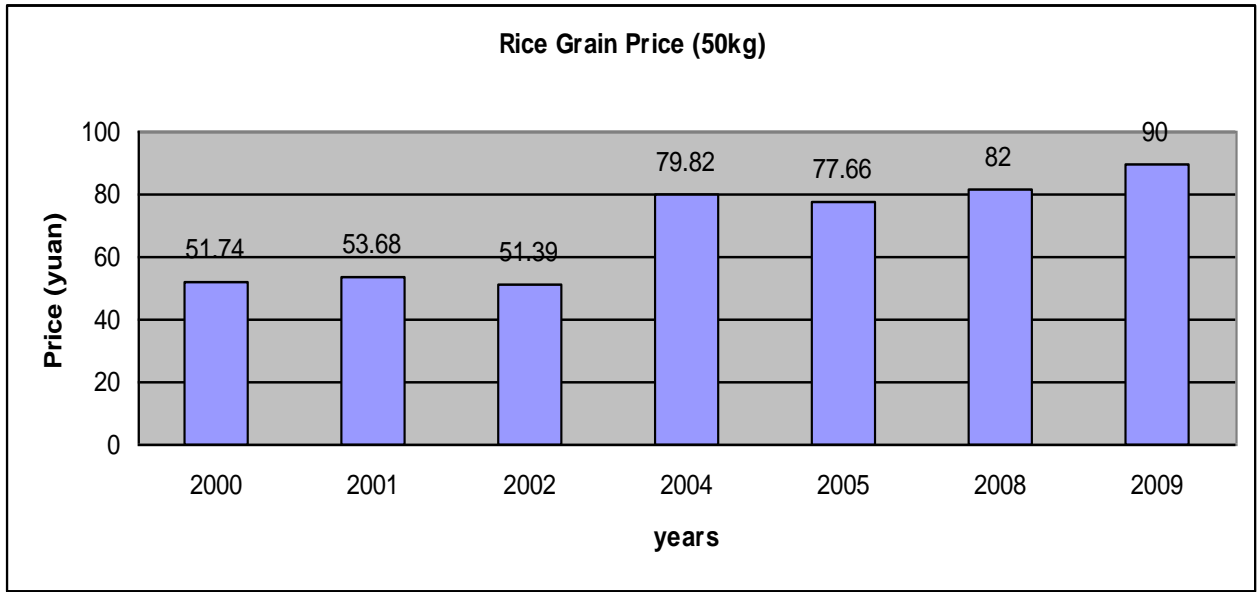
**Figure 7 Grain Production Cost Breakdown**

(One crop *yuan/mu*)

Village	Fertilizer	Seeds	Pesticides & Herbicides	Rent	Fuel	Hiring Labor	Harvesting	Plowing	Transporting	Total
A	150	80	80	200	25	50	60	70	10	725
B	65	75	10	0	0	0	0	0	0	150

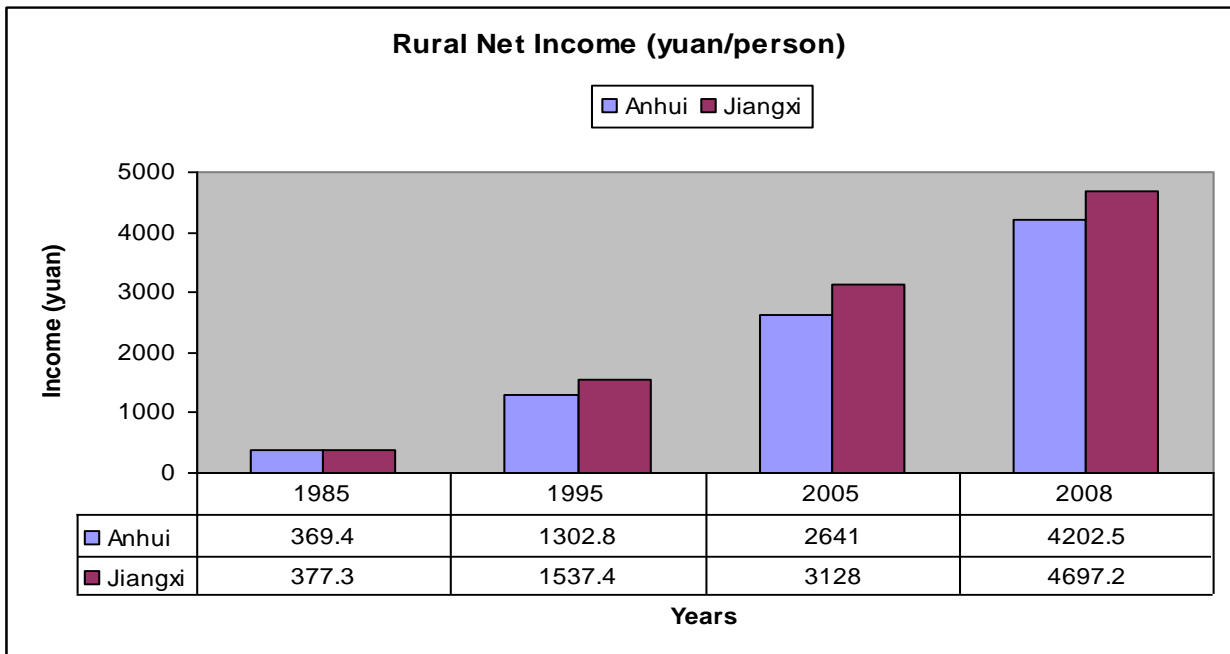
Sources: Author's surveys of village A and village B.

**Figure 8**



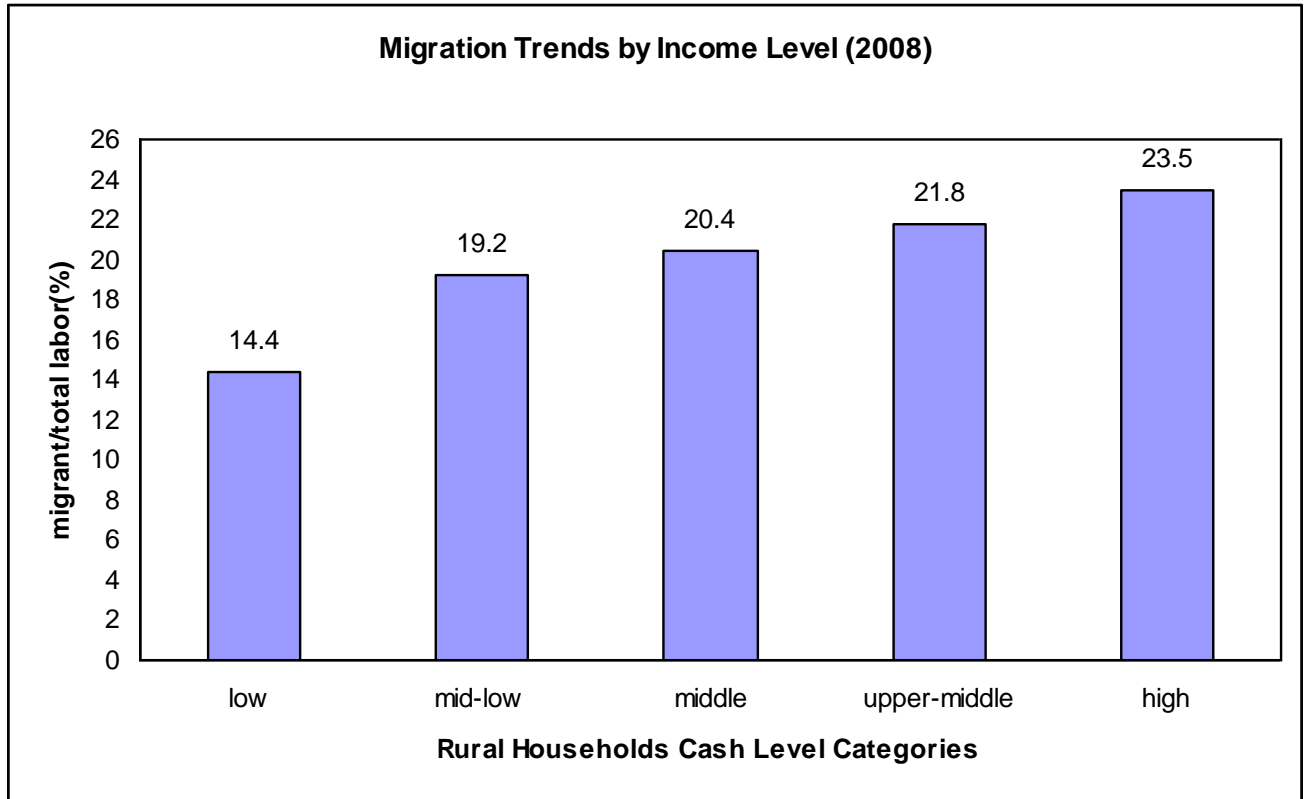
Source: *China Rural Household Survey Yearbook Vol. 2000-2010.*

**Figure 9**



Source: *China Rural Household Survey Yearbook Vol.2008, Poverty Monitoring Report of Rural China Vol.2009.*

**Figure 10**



Source: *Poverty Monitoring Report of Rural China* vol.2009