





# Small-scale farmers in China in the face of modernisation and globalisation

Jikun Huang, Xiaobing Wang and Huanguang Qiu

Center for Chinese Agricultural Policy, Chinese Academy of Science  
2012

This paper is a product of the Knowledge Programme Small Producer Agency in the Globalised Market. The Knowledge Programme aims to map, elicit and integrate knowledge on the dilemmas confronting small-scale producers in global, regional and national markets. The programme works with different actors to bring new voices, concepts and insights into the global debate. It thereby seeks to support the development community, including policy makers, producer organisations and businesses, in their search for better informed policies and practices. The programme is led by the Humanist Institute for Development Cooperation (Hivos) and the International Institute for Environment and Development (IIED), and integrates a global learning network, convened by Mainumby Ñacurutú in Bolivia.

First published in 2012 by the Knowledge Programme Small Producer Agency in the Globalised Market, a joint initiative of:

International Institute for Environment and Development (IIED)  
80-86 Gray's Inn Road, London, WC1X 8NH  
Tel: +44 (0)20 3463 7399  
Fax: +44 (0)20 3514 9055  
newpubs@iied.org  
www.iied.org

Hivos  
Raamweg 16  
PO Box 85565, NL- 2508 CG  
The Hague, The Netherlands  
info@hivos.net  
www.hivos.net

Copyright © International Institute for Environment and Development/HIVOS

Citation: Huang, J , Wang, X, Qui, H (2012) *Small-scale farmers in China in the face of modernisation and globalisation*, IIED/HIVOS, London/The Hague.

Design: cover – Andy Wilkinson, inside – Eileen Higgins  
Printed by Park Communications, UK on 100% recycled paper using vegetable oil based ink.

ISBN: 978-1-84369-869-2

A catalogue record for this paper is available from the British library.

The publication can also be downloaded from: <http://www.hivos.net/Hivos-Knowledge-Programme/Publications> or <http://pubs.iied.org/>

This work is licensed under the Creative Commons Attribution-Share Alike Works 3.0 Netherlands Licence. To view a copy of this licence, visit <http://creativecommons.org/licences/by-sa/3.0/nl/> or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

# Contents

About the authors	1
<b>1. Introduction</b>	<b>3</b>
<b>2. China's agriculture under transition</b>	<b>5</b>
2.1 Overview of China's economy	5
2.2 Structural changes in China's economy	6
2.3 Agricultural growth and structural changes	7
2.4 Geographical relocation and concentration of agriculture	8
2.5 The nature of small-scale farming	16
<b>3. Production, marketing and income generation of small-scale farmers</b>	<b>19</b>
3.1 Land tenure, land-rental markets and small farmers	19
3.2 The market, food safety, small farmers and globalisation	23
3.3 Individual farmers and farmers' cooperatives, including farmers' attitudes to collective action	28
3.4 Producer perspectives on farming	30
3.5 Off-farm employment and migration: gender and age effects	35
3.6 Wage rates, increasing wage-earners and the stagnation of male self-employment	38
<b>4. Producer perspectives on farming</b>	<b>43</b>
<b>5 Concluding remarks</b>	<b>45</b>
References	47

## Maps

2.1: Chinese rice production by county, 2005–2010	10
2.2: Chinese wheat production by county, 2005–2010	11
2.3: Chinese maize production by county, 2005–2010	12
2.4: Chinese milk production by county, 2005–2010	13
2.5: Chinese pork production by county, 2005–2010	14
2.6: Chinese poultry production by county, 2005–2010	15

## Figures

3.1: Incidence of households renting-in and renting-out land, 2000–2009	22
3.2: Real wage rates, 1975–2009	22
3.3: Expenditure on mechanisation services in rice and wheat production nationally and in Jiangsu, 1975–2009	31
3.4: Labour input in rice and wheat production nationally and in Jiangsu, 1975–2009	33
3.5: Trends in off-farm employment, 1982–2008	40
3.6: Trends in wage-earning employment, 1982–2008	41
3.7: Trends in self-employment, 1982–2008	42

## Tables

2.1: Annual growth rates of China's economy, 1970–2010	5
2.2: Changes in structure of China's economy, 1970–2010	6
2.3: Annual growth rates of China's agricultural economy, 1970–2010	7
2.4: Output-value shares in China's agricultural economy, 1970–2010	8
2.5: Shares of crop-sown areas, 1970–2010	9
2.6: Descriptive statistics of the nature of Chinese farms, 1985–2010	17
3.1: Characteristics of households and the incidence of rent-in and rent-out activities in 2000, 2008 and 2009	21
3.2: Changes in agricultural subsidy per household (2007–2008) and in incidence of rent-in and rent-out activities (2008–2009)	21
3.3: Supply and marketing channels of horticultural markets in the Greater Beijing Area, 2004	24
3.4: Contracting arrangements in apple- and grape-producing villages in Shandong, 2005 (%)	25
3.5: The structure of dairy production in rural villages in the Greater Beijing area before and after the Milk Scandal (August 2008–September 2009)	26
3.6: Written contracts for dairy farmers who sold milk, by sales channel, Greater Beijing, 2004, 2008 and 2009	27
3.7: Safety and quality inspection of milk, by sales channel, Greater Beijing, 2004 and 2009	27
3.8: Farmers' attitudes to farmer professional cooperatives (FPCs), 2010	29
3.9: Mechanisation services in rice and wheat production, Jiangsu province, 2002–2010	32
3.10: Labour inputs by gender in rice and wheat production in Jiangsu province, 2002–2010	34
3.11: Off-farm employment by age cohort and gender, 1990, 2000 and 2008	36
3.12: Rural labourers employed in wage-earning and self-employment by gender and age cohort, 2000 and 2008	37
3.13: Average earning difference between wage-earners and self-employers by gender, 2000 and 2008	39
4.1: Employment status and perspective of rural labourers, 2010	44

## About the authors

**Jikun Huang** is Director of the Center for Chinese Agricultural Policy (CCAP), Chinese Academy of Sciences (CAS), and Professor at the Institute of Geographical Sciences and Natural Resources Research. He holds a PhD in agricultural economics from the University of the Philippines at Los Banos. His research focuses on agricultural policy and rural development in China and global food security. He founded CCAP in 1995 and has served as director and professor since then. Previously he held research positions at the China National Rice Research Institute, the Institute of Agricultural Economics of the Chinese Academy of Agricultural Sciences, and the International Food Policy Research Institute (IFPRI). Huang has published some 180 papers in Chinese journals and more than 170 papers in refereed international journals, including *Nature*, *Science* and the *Journal of Development Economics*. He has authored or co-authored 17 books.  
Contact: jkhuang.ccap@igsnr.ac.cn

**Xiaobing Wang** is an associate professor at the Center for Chinese Agricultural Policy (CCAP), Chinese Academy of Sciences (CAS). She holds a PhD from Martin-Luther University Halle-Wittenberg, Germany. Before joining CCAP, she worked as a research associate in Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO), Germany. Her research focuses on the development of labour markets, poverty and productivity analysis in China and other transition countries. She has published several papers in the journals *Food Policy*, *World Development*, *China Economic Review*, and *Agricultural Economics*.  
Contact: xbwang.ccap@igsnr.ac.cn

**Huanguang Qiu** is currently an associate professor at the Center for Chinese Agricultural Policy (CCAP), Chinese Academy of Sciences (CAS). His major research fields are consumer behaviour and household studies, regional agricultural development, international and domestic agricultural trade policy, applied statistics and general equilibrium model analysis. He obtained his PhD in agricultural economics from the Chinese Academy of Sciences in 2005, and worked at the Center for World Food Studies in the Netherlands as postdoctoral research fellow in 2006. He has published several papers in international peer reviewed academic journals.  
Contact: hgqiu.ccap@igsnr.ac.cn



## Introduction

The development of China as a global economic power is one of the most dramatic stories of recent decades. China's economy has been the fastest growing in the world since 1980. Rapid growth has occurred in all sectors, including agriculture, accompanied by rapid poverty reduction. In the past 30 years, based on China's official poverty line, the absolute level of rural poverty fell from 260 million (36 per cent of rural population) in 1978 to 26.9 million (2.8 per cent of rural population) in 2010 (NSBC, 2011). Moreover, the general welfare of most of the population has increased markedly. Many indicators of nutritional status have improved. In fact, by the middle of 2007, China had achieved many of its Millennium Development Goals.

China's agricultural sector has changed dramatically since the late 1970s. It grew at about 5 per cent annually in the past three decades. While significant growth has occurred in almost all cropping sectors, the production of some crops has grown more rapidly (NSBC, 2011a). Hence, crop structure has been changing, diversifying out of staple grains into higher-valued crops (Huang *et al.*, 2010). The same is occurring in terms of the shift out of cropping into livestock, aquaculture and off-farm employment (NSBC, 2011b).

While past accomplishments are impressive, there are still great challenges ahead. Income disparity, for example, rose with economic growth. Such disparities are significant between regions, between urban and rural populations, and between households within the same location (Cai *et al.*, 2002; World Bank, 2002; NSBC, 2010). The nation's rapid industrialisation, urbanisation and globalisation have been accompanied by rising pressures of inflation, national food insecurity and environmental degradation.

In agriculture, while successful technology innovation has helped China to increase its productivity, China may face great challenges in the future. Rising demand for domestic and industrial water use poses a serious constraint to irrigated agriculture (Wang *et al.*, 2006). Changes in national land policy helped China to increase agricultural productivity in the early reform period, and contributed significantly to the reduction of rural poverty. However, land holdings are so small that farming activities alone cannot continue to raise the incomes of most rural households.

One of the most conspicuous trends in production is for households to have smaller and smaller farm sizes. Between 1980 and 2000, the average size of land controlled by a household fell from 0.71 to 0.55 hectares (NSBC, 2011b). Moreover, while the rate of growth of production and marketing cooperatives (called Farmer Professional Associations—FPAs) has risen, only a small proportion of villages and farmers are members. According to Shen *et al.* (2005), as of 2005, in all of China, only about 2 per cent of farmers belonged to cooperatives, a level of participation far below almost all other East Asian nations (and many Western nations during their development years), where participation rates were almost 100 per cent.

On the other hand, China has been experiencing rapid modernisation and globalisation, affecting the lives and livelihoods of hundreds of millions of people. The share of industry and service sectors in gross domestic product (GDP) has been rising and exceeded 90 per cent in 2011. Also in 2011, China's urban population exceeded the rural population for the first time. The number of people living in townships and cities reached 690.8 million, while the rural population fell to 656.6 million at the end of 2011 (NSBC, 2012).

Globalisation is the other major characteristic of China's modern economy. For example, after 30 years of economic reform, China is now considered one of the most liberalised global economies in general, and in terms of agriculture in particular (Huang *et al.*, 2011). The patterns of both production and daily life in China are changing. Globalisation is also occurring in the marketing sector. For example, from their introduction in the early 1990s, supermarkets achieved sales of over \$55 billion in the mid-2000s (Hu *et al.*, 2004). The restaurant industry has also experienced high growth for most of the past two decades (Bai *et al.*, 2010).

Concerns about small-scale farmers in the face of modernisation and globalisation are rising. These trends, while indicative of a rapidly growing economy catering to a consumer base with more and more wealth, are also associated with concerns about quantity, quality and safety of food supply by an agricultural economy dominated by small-scale farmers. Price changes in the international market are often transmitted into the



domestic market, which affects not only every Chinese consumer but also millions of small farmers in every province (Huang and Rozelle, 2006; Huang *et al.*, 2011b).

The aim of this paper is to provide some insights into small-scale Chinese farming in the face of modernisation and globalisation. The paper is based on current literature and on information, existing data and research from the Center for Chinese Agricultural Policy, plus a primary survey on youth perceptions of farming. Specifically, this paper will cover the following questions:

- How is modernisation and globalisation in Chinese agriculture and the wider national economy being experienced and dealt with at the farm level?
- Who is migrating, and who is staying on the farm?
- Are small-scale farmers benefiting from policies or public and private institutional arrangements that empower them to enter and stay in markets, to upgrade or add value, to deal with different customer markets, or to consolidate land?
- Do they have better possibilities for improving or exercising their individual and collective agency and to make better-informed choices about the markets in which they operate?

- What are their attitudes to collective action, especially in the market, and how do these differ in the younger generation?
- Do small farmers influence policies related to the market, and, if so, through what channels?
- How is this likely to play out over the coming years?

To provide some answers to the above questions, the rest of this paper is organised as follows. Section 2 describes China's agriculture under transition, with particular focus on the overall trend of China's agriculture under modernisation and globalisation, geographical relocation and concentration, and the nature of small-scale farming in China. Section 3 discusses production, marketing and income generation of small-scale farmers, with particular attention to: land tenure, the rental market, marketing and food safety under globalisation, individual farmers and farmers' cooperatives, mechanisation and feminisation in agricultural production, off-farm employment and migration. Section 4 provides the results from the survey on producer perspectives of young people and household heads of small-scale farms. Finally, Section 5 summarises and concludes this study.

## China's agriculture under transition

### 2.1 Overview of China's economy

China's leaders implemented various reform measures that have gradually liberalised the institutional and market structure of the economy and stimulated economic growth. Although there is a cyclical pattern in China's growth rates, China's economy has grown at nearly 10 per cent annually since 1980 (Table 2.1). Based on IMF and World Trade Organization data, China became the largest holder of foreign exchange reserves, exporter and economy in the world in 2007, 2009 and 2010, respectively.

The growth accelerated in the first 15 years of reform. In the early reform period,<sup>1</sup> annual growth rates of gross domestic product (GDP) increased considerably from 4.9 per cent in 1970–1978 to 8.8 per cent during 1979–1984 (Table 2.1). High growth was recorded in all sectors. Institutional reforms that saw a shift from collective agricultural production systems to individual household production were the main source of agricultural growth in the early reform period (Lin, 1992; Huang and Rozelle, 1996). The growth of agriculture provided the foundation for the successful transformation of China's reform economy. Annual growth rates of GDP in the industry and service sectors reached 8.2 per cent and 11.6 per cent, respectively, in 1979–1984.

At the same time, rising income in the initial years of reform stimulated domestic demand, and the high savings rate was transferred into physical capital investments in the non-agricultural sectors in both rural and urban areas. 'Opening up' of market economic reform further stimulated China's economic growth. Foreign trade grew at about 15 per cent annually in the 1980s and early 1990s (Table 2.1). The growing demand in both domestic and international markets and rising investment resulted in accelerated growth of the economy. Averaged annual growth of GDP reached 9.7 per cent in 1985–1995. During the same period, family planning lowered the nation's population growth rate, enabling rapid per capita GDP growth (Table 2.1).

The Asian financial crisis of the late 1990s slowed China's economic growth, but the recovery was rapid thereafter. China's annual GDP growth fell to 8.2 per cent in 1996–2000, compared with 9.7 per cent in 1985–1995 (Table 2.1). However, GDP growth returned to nearly 10 per cent again at the beginning of the 21st century. This was largely because the government took decisive actions in various areas to combat slowing growth, created a perception of stability, and re-established producer and consumer confidence. Fiscal spending (mainly on infrastructure) was raised by 100 billion yuan<sup>2</sup> to stimulate demand and increase the efficiency of the

**Table 2.1** Annual growth rates of China's economy, 1970–2010 (%)

	Pre-reform	Reform period				
	1970–78	1979–84	1985–95	1996–00	2001–05	2006–10
GDP	4.9	8.8	9.7	8.2	9.9	11.1
Agriculture	2.7	7.1	4.0	3.4	4.3	4.5
Industry	6.8	8.2	12.8	9.6	11.4	11.9
Service	n.a.	11.6	9.7	8.3	10.1	11.9
Foreign trade	20.5	14.3	15.2	9.8	25.3	13.8
Import	--	12.7	13.4	9.5	24.9	14.2
Export	--	15.9	17.2	10.1	25.7	13.5
Population	1.80	1.40	1.37	0.91	0.63	0.5
Per capita GDP	3.1	7.4	8.3	7.2	9.0	10.6

Notes: Figure for GDP (in real terms) in 1970–78 is the growth rate of national income in real terms. Growth rates are computed using regression method. Trade growth is based on current value in US dollars. All original data are from NBSC, *Statistical Yearbook of China*, various issues.

Source: Huang *et al.* (2012a).

1. The 'reform period' refers to the years since 1978, when the Government of China instituted its policy of 'reform and opening up'. The years 1979 to 1984 are considered the 'early reform period'.

2. 1 yuan = approximately USD 0.15.

nation's business environment in the second half of 1998. The total fixed asset investment increased by 14.1 per cent in 1998 and 12.4 per cent in the first three months of 1999.

Recently, despite being seriously shocked by the global financial crisis, China's economy has again recovered rapidly. After growing at an average rate of 11.7 per cent between 2003 and 2007, growth rates fell sharply to 9.6 per cent in 2008 (NSBC, 2011a). The drop of 4.6 percentage points between 2007 and 2008 made China's fall in growth rate the largest of any major country. The fall between 2008 and 2009 was less (only 0.4 percentage points). The growth rate recovered to 10.4 per cent in 2010, as a result of the government's massive responses to the global financial crisis (Huang *et al.*, 2011b).

## 2.2 Structural changes in China's economy

Rapid economic growth has been accompanied by significant structural changes in the economy. While the annual growth of agriculture averaged 4–5 per cent throughout the entire reform period, the growth rate of the economy as a whole, and of the industrial and service sectors, were faster (Table 2.1). In fact, since 1985, the growth of the industry and service sectors has been two to three times faster than that of agriculture. Because of the differences in the sectoral growth rates, share of GDP of the agriculture sector (primary industry)

has fallen from 40 per cent in 1970 to 10 per cent in 2010. The share of GDP of the service sector increased from only 13 per cent in 1970 to 43 per cent in 2010 (Table 2.2). These figures highlight the ironic feature of agricultural development: the more transformative role that agriculture plays means that the pace of development will rise and the share of agriculture in the economy will fall.

The shifts in the economy can also be seen in employment. Agriculture employed 81 per cent of labour in 1970. By 2010, however, as the industrial and service sectors grew in importance, the share of employment in agriculture fell to 37 per cent, while the shares of employment in the industry and service sectors increased from 10 and 9 per cent in 1970 to 29 and 34 per cent in 2010, respectively (Table 2.2). By 1995, there were more than 150 million farmers who had off-farm jobs (Rozelle *et al.*, 1999); this rose to 279 million by September 2008 (Huang *et al.*, 2010).

Clearly, from the figures on the economic structure of the economy, from both output and employment perspectives, agriculture is performing in a way that is consistent with the beginning of the modernisation and transformation of China's overall economy—from agriculture to industry and from rural to urban (Nyberg and Rozelle, 1999). The share of rural population declined from more than 80 per cent before 1980 to 50 per cent in 2010 (Table 2.2).

**Table 2.2** Changes in structure of China's economy, 1970–2010 (%)

	1970	1980	1985	1990	1995	2000	2005	2010
<b>Share of GDP</b>								
Agriculture	40	30	28	27	20	15	12	10
Industry	46	49	43	41	47	46	48	47
Services	13	21	29	32	33	39	40	43
<b>Share of employment</b>								
Agriculture	81	69	62	60	52	50	45	37
Industry	10	18	21	21	23	22	24	29
Services	9	13	17	19	25	28	31	34
<b>Trade to GDP ratio</b>	<b>n.a.</b>	<b>12</b>	<b>23</b>	<b>30</b>	<b>40</b>	<b>44</b>	<b>64</b>	<b>50</b>
Export/GDP	n.a.	6	9	16	21	23	34	24
Import/GDP	n.a.	6	14	14	19	21	30	27
<b>Share of rural population</b>	<b>83</b>	<b>81</b>	<b>76</b>	<b>74</b>	<b>71</b>	<b>64</b>	<b>57</b>	<b>50</b>

Sources: NSBC, *China's Statistical Yearbook*, various issues; and *China Rural Statistical Yearbook*, various issues.

## 2.3 Agricultural growth and structural changes

The ups and downs that characterised the performance of agriculture in the pre-reform period disappeared after 1978. All measures of success in agricultural production in China during the 1950s, 1960s and 1970s were surpassed during the reform era, and agriculture finally began to carry out its various roles in the development process. Compared to the early and mid-1970s, when the value of gross domestic product of agriculture rose by 2.7 per cent annually, the annual growth rate more than tripled to 7.1 per cent during the initial reform period of 1979–1984 (Table 2.3). Although during the later reform periods (1985–1995 and 1996–2000) the annual growth rates slowed to

around 4 per cent in real terms, these were still extraordinarily high rates of agricultural growth over such a sustained period.

At least in the early reform period, output growth – driven by increases in yields – occurred in all sub-sectors of agriculture. Between 1979 and 1984, grain production, in general, increased by 4.7 per cent annually (Table 2.3). Production also rose for each of the major grains – rice, wheat and maize. While sown area did not change during this time, annual growth rate of yields for grains in general more than doubled between the late part of the pre-reform era and the early reform period. During the early reform period (1979–1984), the growth of yields of all major grains exceeded the growth of yields during the early and mid-1970s.

**Table 2.3** Annual growth rates of China's agricultural economy, 1970–2010 (%)

	Pre-reform	Reform period				
	1970–78	1979–84	1985–95	1996–00	2001–05	2006–10
<b>Agricultural GDP</b>	2.7	7.1	4.0	3.4	4.3	4.5
<b>Grain production</b>	2.8	4.7	1.7	-0.7	1.1	2.5
<b>Rice:</b>						
Production	2.5	4.5	0.6	0.4	-0.8	1.9
Area	0.7	-0.6	-0.6	-0.5	-0.8	0.7
Yield	1.8	5.1	1.2	0.8	0.0	1.1
<b>Wheat:</b>						
Production	7.0	8.3	1.9	-0.6	-0.4	3.0
Area	1.7	-0.0	0.1	-1.6	-3.1	1.1
Yield	5.2	8.3	1.8	1.0	2.7	1.9
<b>Maize:</b>						
Production	7.4	3.7	4.7	-1.3	5.6	4.4
Area	3.1	-1.6	1.7	0.8	2.7	3.9
Yield	4.2	5.4	2.9	-0.9	2.9	0.5
<b>Other production</b>						
Cotton	-0.4	19.3	-0.3	-1.9	5.3	-0.9
Soybean	-2.3	5.2	2.8	2.6	1.4	-1.7
Oil crops	2.1	14.9	4.4	5.6	0.8	2.7
Fruits	6.6	7.2	12.7	10.2	21.0	5.9
Meats (pork/beef/poultry)	4.4	9.1	8.8	6.5	4.9	2.3
Fishery	5.0	7.9	13.7	10.2	3.6	3.9
<b>Planted area</b>						
Vegetables	2.4	5.4	6.8	9.8	3.1	2.0
Orchards (fruits)	8.1	4.5	10.4	2.0	2.4	8.1

Sources: Huang *et al.* (2012a) and author's estimates based on data from NBSC (1985–2011).

Far more fundamental than rises in output and yields of the grain sector, China's agricultural economy has steadily been remaking itself from a grain-first sector to one producing higher-valued cash crops, horticultural goods and livestock/aquaculture products. Like the grain sector, cash crops in general, and specific crops such as cotton, edible oils and vegetables and fruit, also grew rapidly in the early reform period when compared to the 1970s. Unlike grain (with the exception of land-intensive staples, such as cotton), the growth of the non-grain sector continued throughout the reform era. Hence, in the case of many commodity groups, the high growth rates, which have exceeded those of grains during almost the entire reform era, are continuing to accelerate or at least maintain their high rate of growth. Clearly, the agricultural sector is playing a major role in providing more than subsistence (grain). It is supplying oilseeds for the edible-oil sector, horticultural products for the retail food sector and cotton for the textile sector.<sup>3</sup> It is interesting to note that the rapidly growing cash-crop sector is dominated by small farms with an average size of less than 0.6 hectares in recent years (Wang *et al.*, 2009).<sup>4</sup>

China is also moving rapidly away from crop-first agriculture. The rise of the livestock and fishery sectors has outpaced the cropping sector in general, and most of the subcategories of cropping. Livestock production rose by 9.1 per cent per year in the early reform period and has continued to grow since then, albeit more slowly (Table 2.3). The fisheries subsector has been the fastest-growing component of agriculture, rising more than 10 per cent per year during most years of the reform era. The rapid and continuous rise in livestock and fisheries has steadily eroded the predominance of cropping. The output-value shares of crops in agriculture fell from 82 per cent in 1970 to 55 per cent in 2010. Over the same period, corresponding shares of the livestock and fishery sectors increased from 14 and 2 per cent to

31 and 10 per cent, respectively (Table 2.4). Within the crop-farming sector, structural change to more cash-crop production has also been significant (Table 2.5).

## 2.4 Geographical relocation and concentration of agriculture

In the past three decades, agricultural production in China was also characterised by geographical relocation and spatial concentration (Cho *et al.*, 2007; You *et al.*, forthcoming). To analyse the spatial nature of agriculture, we present the production by commodity from three main grain crops (rice, wheat and maize) and three livestock products (milk, pork and poultry). The results are presented in Maps 2.1–2.6, (pages 10–15) in which (a) shows the spatial distribution of the commodity's output in thousand tonnes per county in 2010 and (b) shows the difference in output by county between 2005 and 2010.

Our results show that the spatial variation of all of the selected commodities show concentration of production across regions. For rice production in the past three decades, the regional pattern was obvious, with the variation of output and its proportion in three main rice-producing regions including North China, the Yangtze River basin and coastal provinces in Southeast China (Map 2.1). Our results indicate that both output and its proportion produced in Northern China, mainly in Northeast China, to China's total output have increased steadily.

For example, rice output in Heilongjiang province in Northeast China increased from 795,000 to 18,439,000 tonnes in the past three decades at the average annual growth rate of 11 per cent. In 2010, the proportion of rice produced in Heilongjiang to total rice output was 9.4 per cent. Rice production in the Yangtze River basin kept relatively stable, with its output proportion at around 50 per cent. However, the proportion of rice output produced in coastal

**Table 2.4** Output-value shares in China's agricultural economy, 1970–2010 (%)

	1970	1980	1985	1990	1995	2000	2005	2010
Crops	82	76	69	65	58	56	51	55
Livestock	14	18	22	26	30	30	35	31
Fishery	2	2	3	5	8	11	10	10
Forestry	2	4	5	4	3	4	4	4

Sources: NBSC, *China's Statistical Yearbook*, various issues; and *China Rural Statistical Yearbook*, various issues.

3. The fall in cotton production in the late 1980s and 1990s had more to do with pest infestations than lack of incentives. In the late 1990s and early 2000s, there was a revival of cotton production with the advent of insect-resistant, genetically modified cotton (Huang *et al.*, 2002). A recent stagnation of cotton was due to the global financial crisis and resultant slow-down of China's textile exports.

4. Wang *et al.* (2009) showed that small and poor farmers are actively participating in the emergence of China's horticultural economy. Markets are very competitive, with hundreds of thousands of small wholesalers and brokers. There is little penetration of modern retailers into rural wholesale markets and rural communities.

**Table 2.5 Shares of crop-sown areas, 1970–2010 (%)**

	1970	1980	1985	1990	1995	2000	2005	2010
Rice	22.1	23.1	21.9	22.3	20.5	19.2	18.6	18.6
Wheat	17.4	19.7	20.0	20.7	19.3	17.1	14.7	15.1
Maize	10.8	13.7	12.1	14.4	15.2	14.8	17.0	20.2
Soybean	5.5	4.9	5.3	5.1	5.4	6.0	6.2	7.0
Sweet potato	5.9	5.1	4.2	4.2	4.1	3.7	3.0	3.2
Cotton	3.4	3.4	3.5	3.8	3.6	2.6	3.3	3.0
Rapeseed	1.0	1.9	3.1	3.7	4.6	4.8	4.7	4.6
Peanut	1.2	1.6	2.3	2.0	2.5	3.1	3.0	2.8
Sugar crops	0.4	0.6	1.0	1.2	1.3	1.0	1.0	1.2
Tobacco	0.2	0.3	0.9	0.9	1.0	0.9	0.9	0.8
Vegetables	2.0	2.2	3.2	4.3	6.3	9.8	11.4	11.8
Others	30.1	23.5	22.5	17.4	16.3	17.2	16.2	11.7
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Sources: NBSC, *China's Statistical Yearbook*, various issues; and *China Rural Statistical Yearbook*, various issues.

regions, including Guangdong, Zhejiang and Fujian provinces, reduced slowly. For example, the share of rice output produced in Guangdong and Zhejiang provinces to total output declined by 5–5.5 per cent in the past 30 years. (In Guangdong, it reduced from 11.6 per cent in 1980 to 6.1 per cent in 2010, whereas in Zhejiang, it reduced to only 3.3 per cent in 2010 from 8.4 per cent in 1980.) This spatial variation can be explained by the increased costs of land and wages in the comparatively developed provinces in coastal regions.

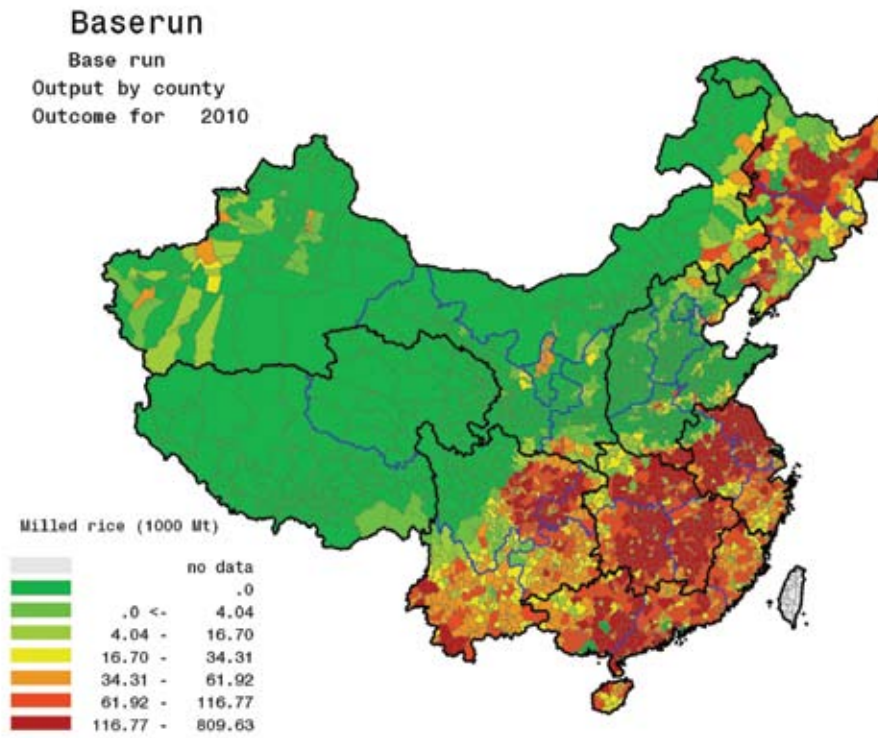
Wheat production increased only in the Huang–Huai–Hai plain, while, in the rest of China, wheat production declined significantly (Map 2.2). One of the factors leading to the reduction in Northeast and Northwest China, the main former wheat-production regions, is that small farmers have substituted vegetable and rice into production. For example, the proportion of wheat produced in Heilongjiang province reduced by more than 6 per cent from 7.2 to 0.8 per cent in the past three decades. Both Maps 2.2a and 2.2b show wheat production concentrated mainly in Henan, Shandong, Anhui and Jiangsu provinces. In 2010, these four provinces produced 63.9 per cent of total national wheat output; more than a quarter of the total wheat output was produced in Henan province.

Map 2.3 presents the spatial pattern of Maize production. Increased output and expansion of sown areas occurred in all of the traditional maize-production regions, especially those located

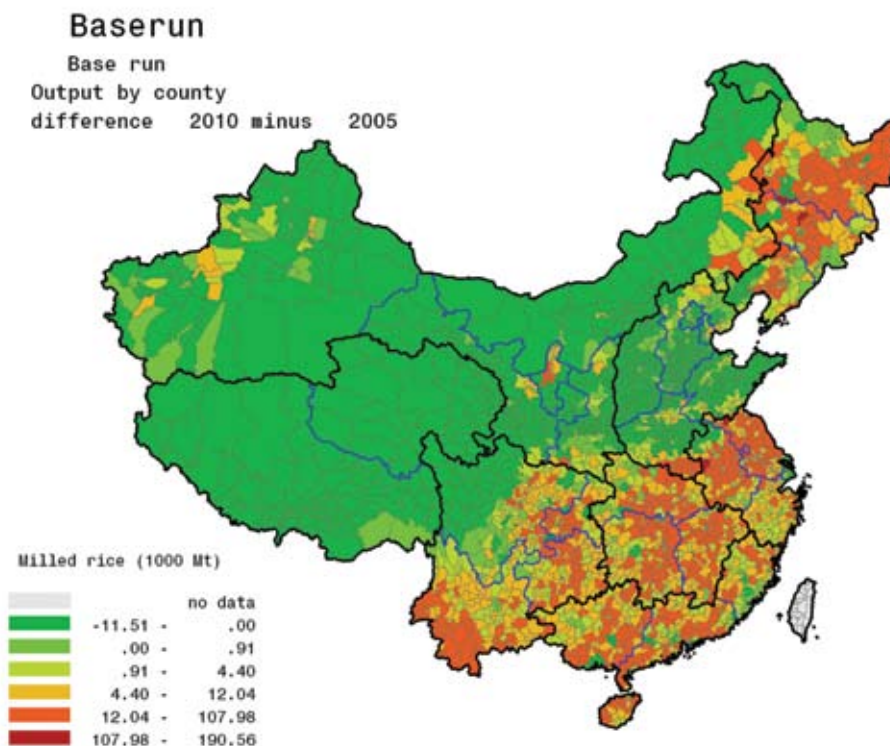
in Northeast and Northwest China. The ratio of maize output produced in Northeast China to total national output increased to 31 per cent in 2010 from the baseline of 26.8 per cent in 1980. In the same period, the proportion of wheat produced in five provinces (autonomous regions) of Northwest China (Shaanxi, Gansu, Xinjiang, Inner Mongolia and Ningxia) to national total wheat output increased by 6.6 per cent to 16.8 per cent in 2010. However, the share of output in Shandong, Henan and Hebei provinces, North China, fell from 32.3 to 28.6 per cent in the past three decades.

The geographical relocation and spatial concentration of livestock products are presented in Maps 2.4–2.6. The results indicate that dairy production measured by milk products (Map 2.4) is still clustered in North China, whereas the production of pork (Map 2.5) and poultry meat (Map 2.6) moved gradually to Southeast China. These spatial variations are mainly driven by both the evolution of livestock production by specialised industries and the wane of production in smallholders' back yards. The increased demand for livestock products led industries to invest in comparatively developed regions like Southeast China to reduce transportation costs. Dairy production is still widely distributed throughout North China, with the trend of regional concentration in three provinces: Northeast China, Inner Mongolia and Xinjiang. The pattern of feed supply has important impacts on spatial distribution of livestock production.

a. Rice output by county, 2010 (billion tonnes)

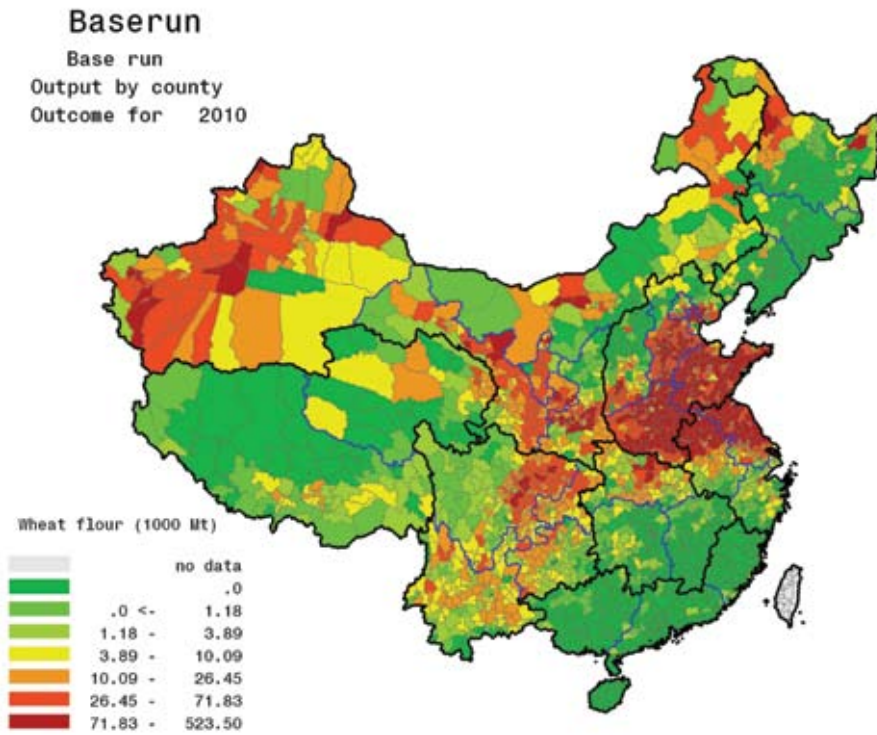


b. Change in rice output by county, 2005–2010

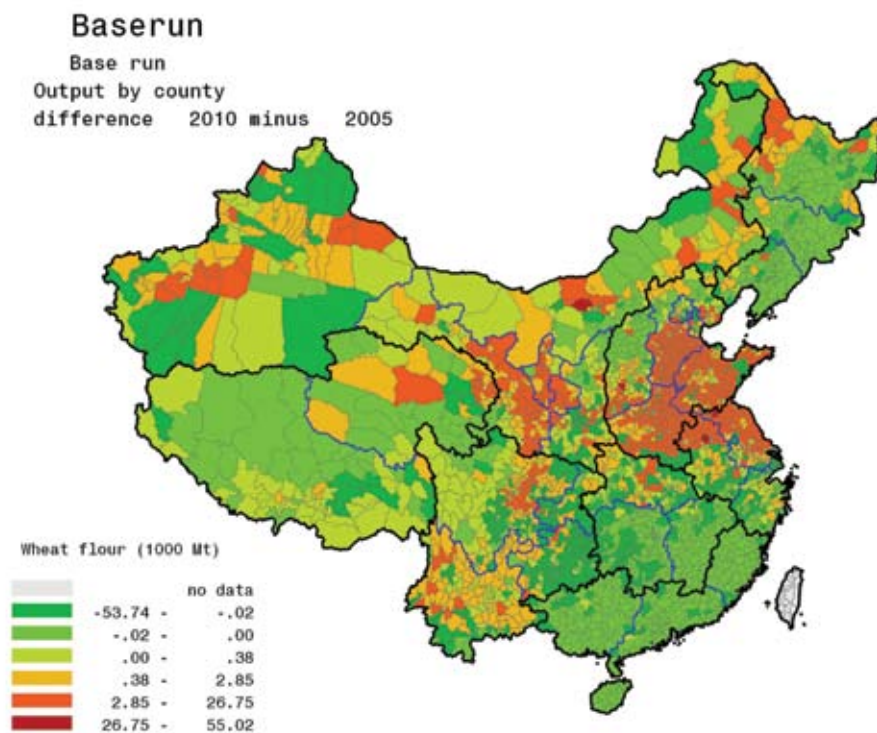


Source: Counties' Statistics (NSBC, 2006; 2011).

a. Wheat output by county, 2010 (billion tonnes)



b. Change in wheat output by county, 2005–2010

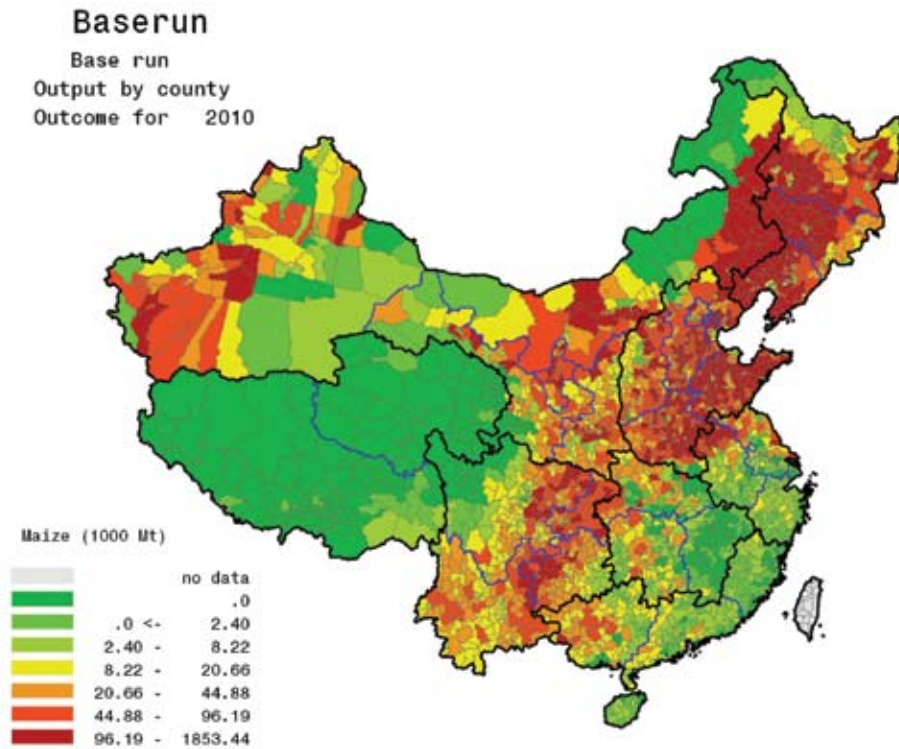


Source: Counties' Statistics (NSBC, 2006; 2011).

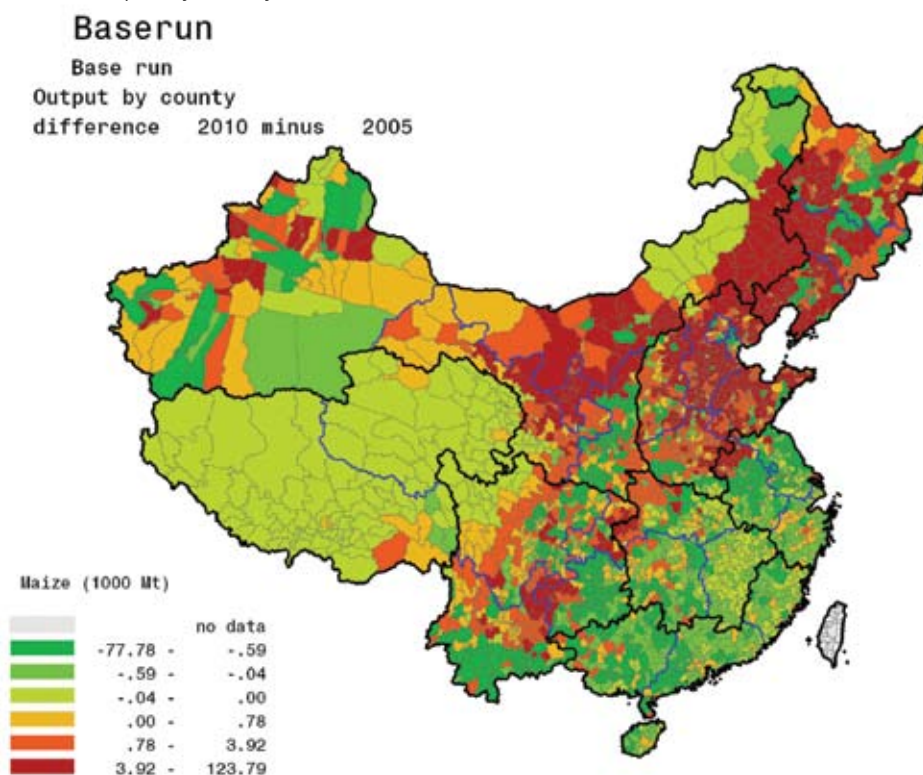


Map 2.3 Chinese maize production by county, 2005–2010

a. Maize output by county, 2010 (billion tonnes)

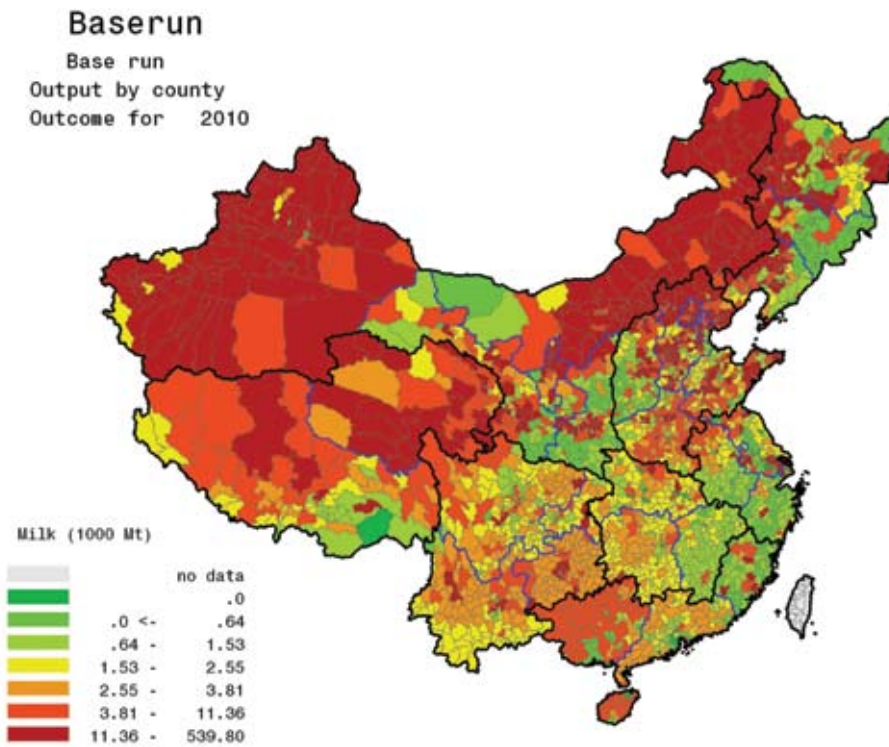


b. Change in maize output by county, 2005–2010

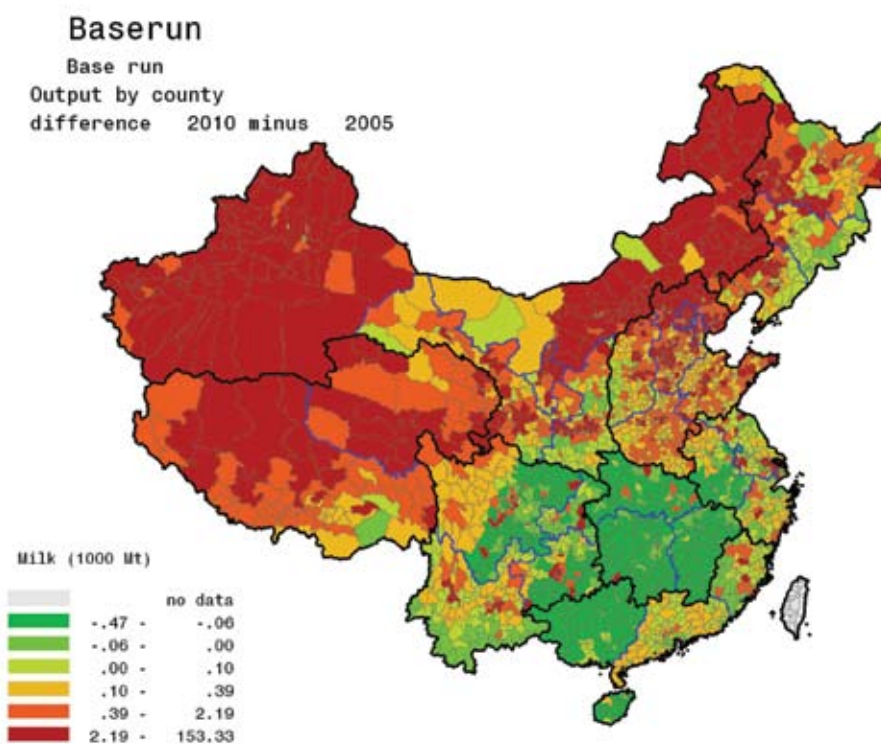


Source: Counties' Statistics (NSBC, 2006; 2011).

a. Milk output by county, 2010 (billion tonnes)

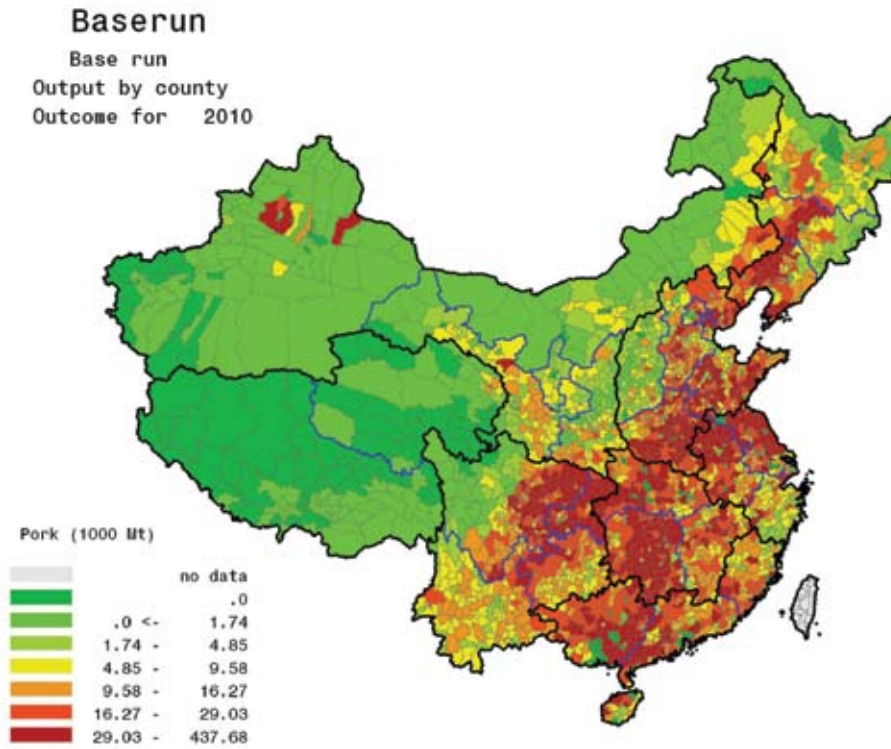


b. Change in milk output by county, 2005–2010

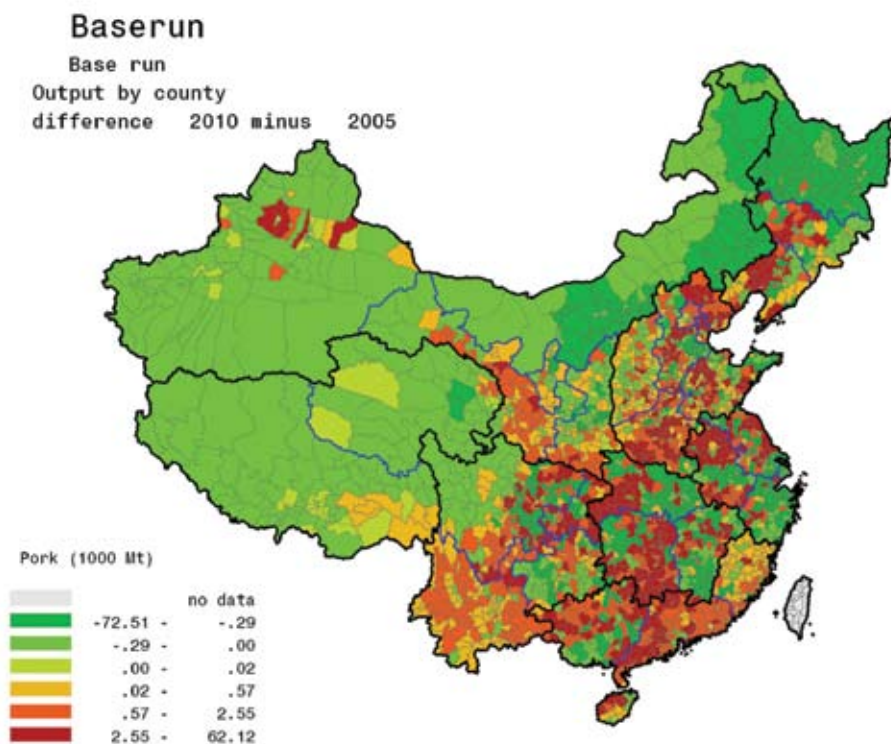


Source: Counties' Statistics (NSBC, 2006; 2011).

a. Pork output by county, 2010 (billion tonnes)



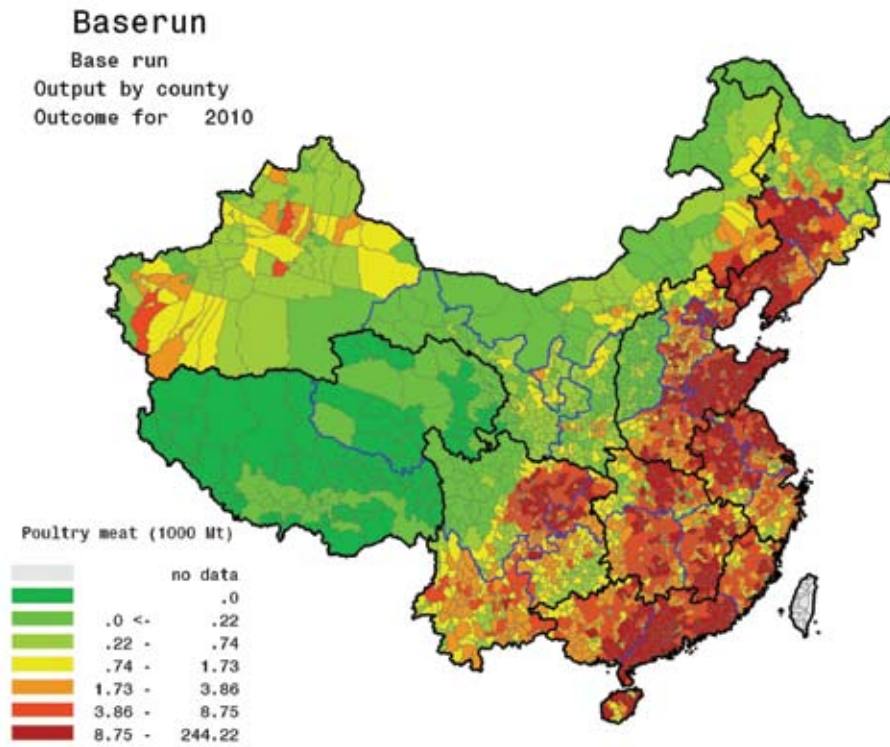
b. Change in pork output by county, 2005–2010



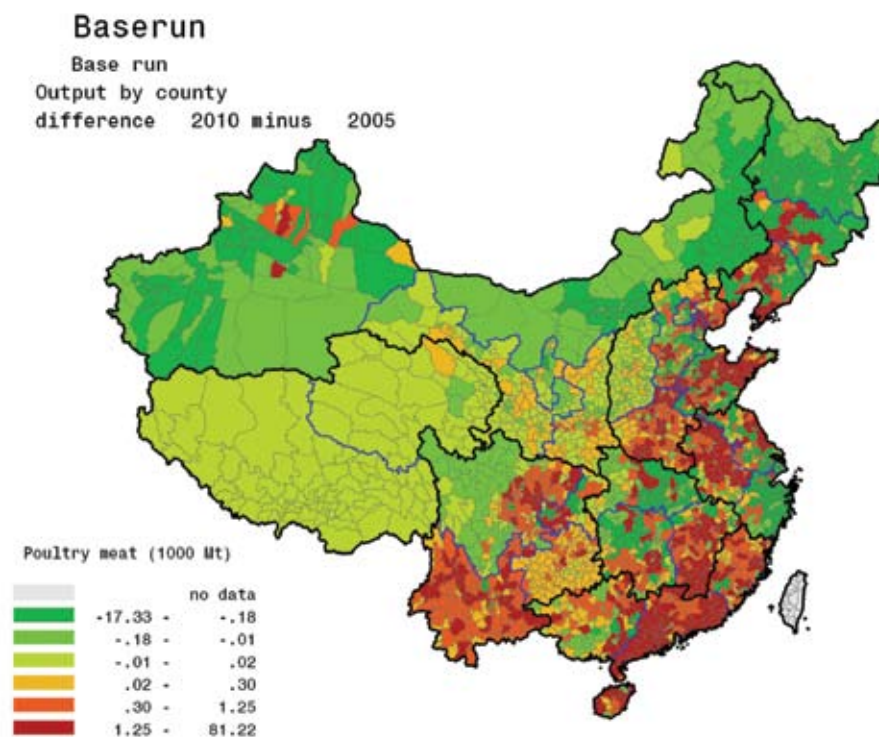
Source: Counties' Statistics (NSBC, 2006; 2011).

Map 2.6 Chinese poultry production by county, 2005–2010

a. Poultry-meat output by county, 2010 (billion tonnes)



b. Change in poultry-meat output by county, 2005–2010



Source: Counties' Statistics (NSBC, 2006; 2011).

## 2.5 The nature of small-scale farming

It is interesting to note that successful agricultural growth and the significant structural changes discussed above have been achieved mostly by small-scale farms. China's agriculture is dominated by about 200 million small farms responsible for the majority of national crop production. Although large-scale livestock production has increased, small farms still play an important role in swine and dairy production (NSBC, 2011b).

In the crop sector, average farm size is small and land is fragmented. When China completed its Household Responsibility reform, allocating village land equally to all households in each village in 1985 (discussed further in Section 3), average farm size was only 0.7 hectares (Table 2.6). Because land quality can differ widely within villages, in consideration of equity in distribution, each household normally has, on average, three or four plots, and some have more than 10 plots. Around 60 per cent of the plots are less than 0.1ha, and close to a quarter of them are larger than 0.15ha, while the rest are in between.

Despite the small average farm size of 0.7 hectares in 1985, this fell gradually to 0.55 hectares in 2000, mainly because of the rising number of rural households and subdivision of land holdings. In the 1980s, farmers allocated more than 75 per cent of their land to produce grain for both home consumption and commercial selling. However, farmers have been gradually moving away from grain production and allocating more land for other crops (notably vegetables and other cash crops). By 2010, the average farm allocated about one third of land to non-grain production (Table 2.6). This change was driven by changing consumption patterns in favour of higher-value commodities.

Interestingly, the falling trend in farm size reversed after 2000. Average farm size has started to rise moderately in the past 10 years (Table 2.6), driven by the emerging land-rental market and the rapid growth of migration due to urbanisation and industrialisation (Gao *et al.*, 2012; Huang *et al.*, 2012c). This is discussed further in Section 3.

Table 2.6 also shows that, over time, households have seemed more concerned with non-agricultural production activities. In the 1990s, the impediments to non-agricultural activities had been largely relaxed, and rural households could locate and maintain capital in non-agricultural businesses under their own control. On average, the capital per household (at 2000 constant prices) has increased substantially from 2489 yuan in 1985 to 8332 yuan in 2010. Even though the capital in agricultural production is increasing as well, its proportion reduced to 69.3 per cent in 2010 from 76.1 per cent in 1985. This suggests the evolution of substituting land-saving technology for rural labour by Chinese rural smallholders, given the increased opportunity costs of farming (Wang *et al.*, 2011a).

Diversification has been occurring not only in agricultural production, as above, but also in labour employment between agricultural and non-agricultural sectors. For example, net income per capita in rural areas measured at 2000 constant prices more than tripled from 1249 yuan in 1985 to 4606 yuan in 2010. Most of this rise in income has come from the non-agricultural sector. Table 2.6 shows that the proportion of income from agriculture decreased rapidly from 66.3 per cent in 1985, to 29.1 per cent in 2010. On the other hand, wage-earning, one of the most important off-farm employments, has become the biggest component of household income. Other sources of income (e.g. self-employment in the non-agricultural sector, income transfer, renting and interest earning) have also increased rapidly (last 3 columns, Table 2.6).

Development economics theory suggests that the gradual evolution of farm structure is paralleled by increased activity of factor markets as an efficiency-improving institution in resource reallocation. The experience in China has mirrored this theory. Associated with other reform policies, increased labour mobility and transfer of land among farmers over the past three decades have gradually overhauled the existing farm structure, especially in terms of the use of land (Huang *et al.*, 2012c). The following section presents a systematic analysis of the development of land rental and rural labour markets, as well as the integration of rural households in cooperatives.

**Table 2.6** Descriptive statistics of the nature of Chinese farms, 1985–2010

	Cultivated land	Share of Sown area to grain	Capital	Share of capital in agriculture	Net income	Share of net income from:		
						Agriculture	Wage-earning	Other
	ha/hh	%	yuan/hh	%	yuan/capita	%	%	%
1985	0.70	75.8	2488.5	76.1	1248.5	66.3	18.2	15.5
1990	0.67	76.5	2392.7	71.5	1305.3	50.2	20.2	29.6
1995	0.65	73.4	2989.4	75.3	1700.1	50.7	22.4	26.9
2000	0.55	69.4	4677.0	71.0	2253.4	37.0	31.2	31.8
2005	0.57	67.1	6550.6	72.4	2979.7	33.7	36.1	30.2
2010	0.60	68.4	8331.6	69.5	4606.1	29.1	41.1	29.8

Note: All value terms are calculated at 2000 constant prices.

Sources: NBSC, *China's Statistical Yearbook* (2011) and *China Rural Statistical Yearbook* (2011).



## Production, marketing and income generation of small-scale farmers

### 3.1 Land tenure, land-rental markets and small farmers

The success of Chinese agricultural production is attributed to a series of radical land reforms (Lin, 1992; Huang and Rozelle, 1995). The core of these reforms is the coexistence of land ownership remaining at the village level, with land-use rights vested in households. This results in a complete and legal prohibition of land sale, but allows for the transfer of land-use rights between households.

China has codified a robust framework for the protection of smallholders' land rights, mainly through the land-tenure system. The initial duration of the land tenure was 15 years, but this was extended to another 30 years after the expiry of the land contract between farmers and the local government.<sup>5</sup> In this system, farmland is allocated equally based on household size, household labour supply or both (Brandt *et al.*, 2002). However, major differences exist across or even within villages in the measures implemented, the degree of implementation and the overall effects of land-security policies (Zhang *et al.*, 2011).

Land reallocated by local leaders is still observed to maintain egalitarianism despite the decrease of cultivated land per capita due to population growth, the shifts of land planning and management, and the process of land degradation (Deng *et al.*, 2006). To intensify the protection of land rights, China's government enacted the Land Management Law (1998), the Land Contracting Law (2003) and the Property Law (2007), but knowledge and practical implementation of these rights are still lagging behind in some rural areas. The top-down changes to legal and political structures did not fully resolve China's continued struggles, with unrest resulting from the summary appropriation of land by developers and local officials.

Under the unique land-tenure system, farmers in China are encouraged to organise agricultural production via both demand and supply of land through the land-rental markets. However, there is no consensus regarding the extent of progress of China's land-rental markets. For example, Liu *et al.* (1998) conclude that households may refrain from entering into land-rental markets because of

the potential risk of being assigned inferior land in future reallocations by village authorities. Brandt *et al.* (2002) believe a number of barriers, such as land-tenure arrangements and mandatory marketing delivery quotas, continue to increase transaction costs without official platforms for transferring land between small farms; these, in turn, dampen the participation of households in land-rental markets. Carter and Yao (2002) worry that underdeveloped factor markets, including the credit and labour markets, restrict households' access to the land-rental markets. The hypothesis that land-market imperfections persist is also supported by the study of Chen *et al.* (2011), who identify an inverse relationship between farm size and productivity, indicating the constraints of land-rental markets.

In contrast, other work has illustrated the emergence of improved land-rental markets and the breakdown of institutional barriers that once prevented the transfer of land-use rights. Yao (2000) shows that, associated with the development of the labour market, significant differences in human capital especially determine households' access to the land-rental market. This conclusion is mirrored by the findings of Kung (2002), which provided substantial evidence that the increasing incidence of land-rental activity and magnitude of rented area is associated with more channels of off-farm employment in rural China. Based on data collected in six provinces in 2009 by the Center for Chinese Agricultural Policy, we analyse the functioning of land-rental markets under the new policy portfolio, with special attention to recent trends in renting-in and renting-out land. The results are reported in Figure 3.1 and Tables 3.1 and 3.2. Figure 3.1 shows the trend of the incidence of land-lease activities from 2000 to 2009, which increased considerably in this period. In particular, the percentage of farmers that rented-in land almost doubled from the base level 10 per cent in 2000, while the percentage of farmers that rented-out land increased to 19.3 per cent, at the yearly growth rate of 13.7 per cent from 2000 to 2008. However, it is noticeable that 2008 is a turning point with the evidence that both renting-in and renting-out decreased from 2008 to 2009. Specifically, the percentage of farmers that rented-

5. The initial land tenure differs significantly across provinces, and even between counties in the same province, due to differences in the process of introducing the Household Responsibility System (HRS).



in land decreased 1.9 per cent from 2008 to 2009, and almost returned to the 2007 level of 17.1 per cent. The incidence of renting-out reduced by 0.8 per cent from 2008 to 18.5 per cent in 2009. Our survey included the share of rented-in plots as well as the share of area rented-in, in 2000 and 2008. Since the size of the rented-in plot is slightly larger than the average own plot, the share of the number of plots (31.7 per cent in 2000 and 31.6 per cent in 2008) is smaller than the share of the area (35.0 in 2000 and 48.2 per cent in 2008). From this, we can also see that the average size of the rented-in plot is growing over time.

It is not easy to identify (in terms of cause and effect) the determinants of changes in cultivated rental markets, but there appears to be an acceleration from 2003 to 2008. One possible interpretation of this could be that the National Contracting Law, in effect after 2003, explicitly provided secure rights for those who rent out their cultivated land, giving rise to more rental transactions. Table 3.13 also shows the correlation between the rising trend of households engaged in land-rental markets between 2000 and 2008 and the increases in off-farm employment. The relationship between households with rented-out land and off-farm employment is even more obvious when assessing the off-farm employment by type of household member. In 2000 when the head of the household worked in the off-farm employment market, those households tended to have a higher probability of renting out their cultivated land (10.5 per cent, Table 3.1) than when other household members were employed off-farm (7.7 per cent). The same relationship was observed in 2008.

However, there were many other changes during the mid-2000s. For example, rising wage rates and increasing off-farm employment opportunities—especially in China's cities—might also be behind the rise in cultivated-land rental transactions (Figure 3.2).

Given multiple drivers of the land-rental market, Huang *et al.* (2012) have recently used a unique, nationwide set of household-level panel data, and applied econometric analysis to identify major factors affecting renting-in and renting out-activities and beneficiaries of rental market development. Their results show that off-farm labour markets and cultivated-land rental markets are highly correlated.

In particular, off-farm employment appears significantly to encourage rural households to rent-out cultivated land. This is an important finding for policymakers concerned with equity and welfare for those remaining in the village. Those remaining are renting-in land and farming more land. As off-farm employment continues to rise, these results give us hope that more cultivated land will be rented-out to households interested in expanding their farm size and focusing on farming rather than off-farm employment.

The findings of Huang *et al.* (2012c) also show that the renting-in and renting-out of cultivated land has facilitated better use of small farms' available resources and resulted in more equitable distribution of land. For example, they found that cultivated land has been shifting from households with less family labour (or less agricultural equipment) to households with more family labour (or more agricultural equipment), and shifting from households with more of their own cultivated land to those with less. Relatively small farms, in terms of land area or household size, have benefited more from the rental market.

To explain why the break of land-rental activities appeared in 2009, we first explore the change of characteristics of farms and households in off-farm employment, and then look at the exogenous policy effects. The results in Table 3.1 indicate that the characteristics of farms and households in off-farm employment between 2008 and 2009 were not statistically significantly different. Table 3.2 tabulates the change of the percentage of households from 2008 to 2009 in land-rental markets with the categories of the increased agricultural subsidy from 2007 to 2008. The results show the negative correlation between the reduced share of farmers in land-rental activities and the increased agricultural subsidy measured as the amount of subsidy per hectare from 2007 to 2008.

All of the results make us conclude that the functioning of land-rental markets improved in the past decade, despite constraints such as transaction costs. However, the further development of land-rental markets is indirectly influenced by agricultural policies, including agricultural subsidy, and connected with rural labour markets.<sup>6</sup> Farmers who remain in the village are normally relatively small, and have benefited from the rapid transition of China's labour and land markets.

6. The impact of agricultural subsidy on land-rental markets can vary with the magnitude of the subsidy and the distribution pattern. For example, who – the owner or the tenant – should obtain the subsidy?

**Table 3.1** Characteristics of households and the incidence of rent-in and rent-out activities in 2000, 2008 and 2009

	2000			2008			2009		
	Sample	Percentage (%) of households with		Sample	Percentage (%) of households with		Sample	Percentage (%) of households with	
		Rent-in	Rent-out		Rent-in	Rent-out		Rent-in	Rent-out
<b>Off-farm employment (%)</b>									
0	717	8	6	615	19	17	603	17	15
(0, 25]	64	13	5	102	27	27	106	25	18
(25, 34]	67	4	9	84	26	15	90	19	23
(34, 50]	93	13	4	112	19	26	105	18	25
(50, 100]	47	15	23	75	9	33	84	7	30
<b>Own cultivated land (ha)</b>									
[0,0.05]	331	13	10	320	20	22	322	19	22
(0.05,0.11]	374	6	5	337	15	17	337	13	16
>0.11	283	8	6	331	22	19	329	20	18
<b>Agricultural production equipment (1000 yuan)</b>									
[0,0.02]	292	5	11	347	13	33	347	13	33
(0.02,0.5]	453	9	6	304	24	11	304	26	11
>0.5	243	12	3	337	17	10	337	17	10
<b>Head's age (year)</b>									
<45	453	7	7	261	18	18	226	15	18
[45,55]	357	12	4	353	22	15	349	21	14
>55	178	7	10	374	18	24	413	16	22

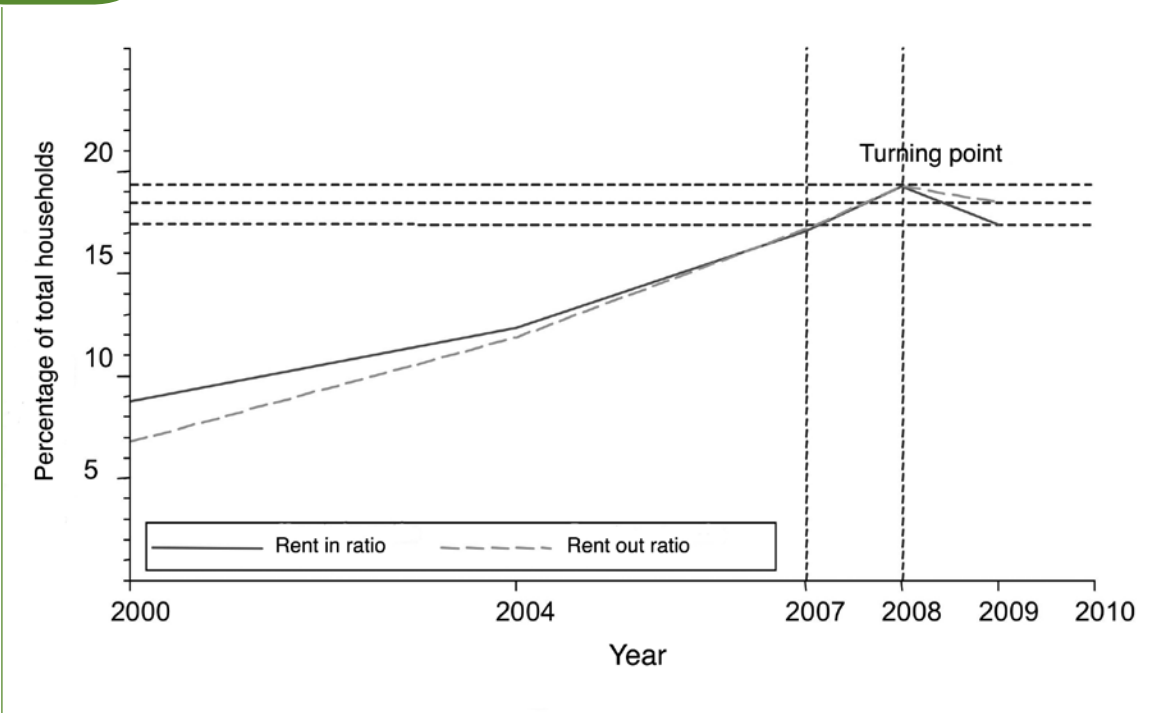
Notes: The data were collected by the authors in 2000 and 2009 in six provinces including Hebei, Liaoning, Shaanxi, Zhejiang, Hubei, and Sichuan. A total of 1160 households were surveyed (6 provinces x 5 counties x 2 villages x 20 households—less 40 households in two earthquake-damaged villages in Sichuan). With careful cleaning, 988 households were used for this study.  
Source: Huang *et al.* (2012b).

**Table 3.2** Changes in agricultural subsidy per household (2007–2008) and in incidence of rent-in and rent-out activities (2008–2009)

The increase of agricultural subsidy from 2007 to 2008 (yuan/hh)	Sample	Change in percentage of households from 2008 to 2009	
		Rent-in	Rent-out
Average : 122	988	-1.90	-0.80
<b>Categories</b>			
0–100	539	-1.30	0.55
100–200	248	-0.81	-1.61
200–300	120	-4.17	-3.33
>300	81	-6.17	-3.71

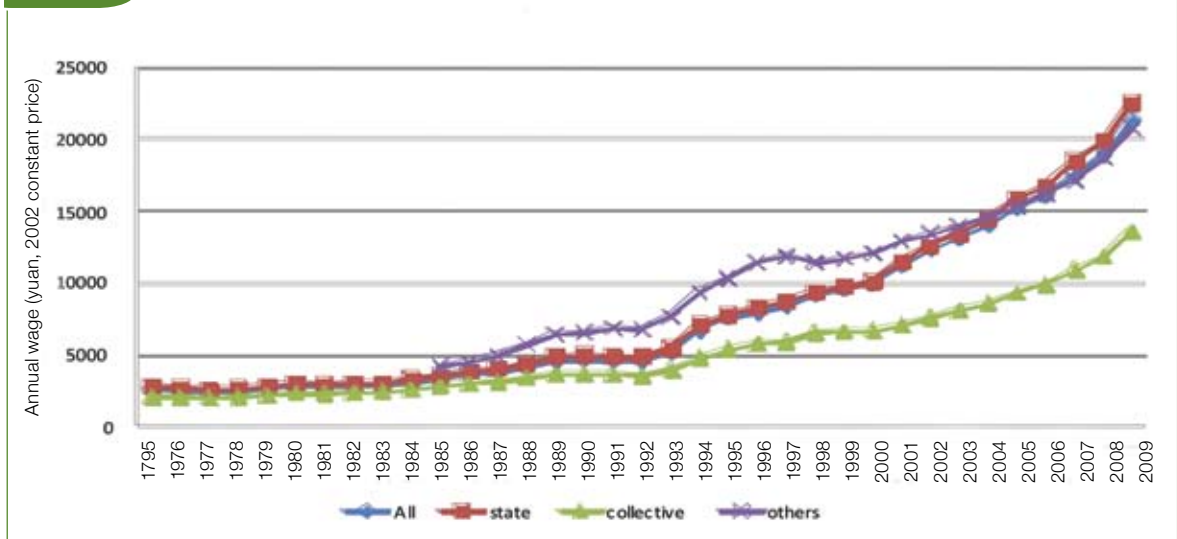
Note: Data sampling is presented in the notes to Table 3.1.  
Source: Huang *et al.* (2012b).

**Figure 3.1** Incidence of households renting-in and renting-out land, 2000–2009



Note: Data sampling is outlined in the note to Table 3.1.  
Source: Huang *et al.* (2012b).

**Figure 3.2** Real wage rates, 1975–2009



Note: Wages deflated using the urban CPI.  
Sources: NSBC (2010), P.R. China's 60 years and China's Statistical Yearbook, Wang *et al.* (2012).

### 3.2 The market, food safety, small farmers and globalisation

Despite improving food quality at all levels, China has been facing a storm of criticism over the quality and safety of its products for domestic and export markets. In Beijing, politicians are scrambling to calm growing scandals over the quality and safety of exports made in China, and a series of international recalls from the EU, the USA and Japan. Among these, the international food-safety scares triggered by Chinese food exports raised global concerns about the quality and safety of food products from China.

In fact, food sold within China is far more hazardous than that exported. Despite the demand for improved food quality, the reality is that some food sold is of rather poor quality. China's media have often announced that greedy and opportunistic traders continue to take advantage of the country's chronically weak enforcement of regulations. A nationwide check on the quality of food and consumer products in 2008 indicates that nearly 20 per cent of the products were substandard or tainted, underscoring the risk faced by domestic consumers.

Consequently, Chinese politicians are demanding improved food quality and enforcement of the governmental quality control system. Food quality and food security is a major benchmark of the national and global development agenda. On 17 August 2007, the government of China published a white paper entitled 'China's food quality and safety', focusing on an improved regulatory system and mechanism for food safety. The government also completed a legal setting of relevant food standards, and conducted a strict quality supervision and certification control. The authorities were initially reluctant to address the scandals on food quality and safety, but domestic and international pressures have pushed the Chinese government to launch several sweeping measures to clean up shoddy manufacturing practices and stop the illegal businesses at the heart of recent safety scandals. However, the special regulations issued by the government tend to intensify control and supervision of food manufacturers and distributors.

Another driver of changes in food quality is the emergence of modern forms of retailing in China. The size of the food market overall is growing, and modern retail formats are profiting from this development. There are seven main types of food

retail outlet in China: hypermarket, supermarket, convenience store, department store, foodstuff store, farmers' market (wet market) and 'mom and pop' store. China's food retail sector has been transformed since the 1990s by the rapid rise of supermarkets, hypermarkets and convenience stores. Foreign retailers have also made significant inroads in China's food market transformation. What are the potential implications of the rise of modern supply chains and their procurement agents for the marketing of agricultural products by small-scale farmers in rural areas? Further, if modern supply chains or contracts between buyers and sellers have an impact on the marketing of agricultural products, how does this affect food safety? To answer these questions, we used data collected in two surveys of horticultural goods: one in Greater Beijing and the other in Shandong province (Huang *et al.*, 2008b).

The main results are summarised in Tables 3.3 and 3.4. Table 3.3 clarifies changes in the downstream segment of the marketing chain. Interestingly, supermarkets are completely absent at the farm gate; not one of the 201 village leaders interviewed reported the presence of supermarkets for the procurement of any horticultural goods (column 1). Likewise, village leaders reported that only 2 per cent of procurement from farmers was from specialised suppliers and only 2 per cent was from processing firms (columns 2 and 3). Hence, in the Greater Beijing area in 2004, only 4 per cent of all horticultural goods were procured by those operating in firms that could be described as part of the modern supply chain. Data from the households in an intensive survey in 50 of the 201 villages in Greater Beijing show the same pattern: households sold almost all of their output to small traders—either in the village or in local wholesale markets. By far the largest majority of buyers are either small brokers or small traders in wholesale markets; not one household reported that they sold to a supermarket or a specialised supplier.

In the case of horticultural products, Huang *et al.* (2008b) also find that there is a great challenge for China's small-scale farmers to ensure delivery of a safe product, on the basis of safe inputs to production (Table 3.4). One basis for this statement comes from Huang *et al.*'s data on contracting between sellers and buyers; in short, there is almost no activity based on contracts. There were also no implicit contracts for inputs – all seed, fertiliser and credit were obtained by the farmers from the market on their own. Extension services are also almost never provided by buyers.

**Table 3.3** Supply and marketing channels of horticultural markets in the Greater Beijing Area, 2004

a. First-time buyers (%)								
	Modern supply chains			Traditional supply chains		Other supply chains		
	Supermarkets	Specialised suppliers	Processing firms	Small traders	Farmers sell in local periodic markets	Cooperatives	Consumers direct purchase from farmers	Others <sup>1</sup>
Horticultural crops	0	2	2	79	8	0	7	2
Vegetables	0	3	5	82	5	0	1	3
Fruit	0	1	1	75	11	0	9	3
Nuts	0	6	0	88	3	0	3	0
b. Second-time buyers (%)								
	Modern supply chains			Traditional supply chains		Other supply chains		
	Supermarkets	Specialised suppliers	Processing firms	Small traders	Traders sell to consumers in periodic markets	Cooperatives	Others <sup>2</sup>	
Horticultural crops	3	3	10	49	13	0	22	
Vegetables	6	0	6	57	11	0	20	
Fruit	1	2	9	46	16	0	26	
Nuts	3	10	19	50	6	0	12	

Notes: 1 'Others' (first-time buyers) includes purchases by agents of hotels or restaurants, gifts to other farmers or procurement by organised groups (such as enterprises for distribution to their workers).

2 'Others' (second-time buyers) includes sales to other villages and sales to market sites that supply processing and other food firms.

Source: Wang *et al.* (2009).

Turning to the evolution of the dairy industry, we next consider how the government supervises the quality of dairy products. Before the Chinese 2008 milk scandal,<sup>6</sup> the dairy industry in China depended mostly on small, poor farmers (Huang *et al.*, 2010). In the mid-1990s, the average dairy household owned and milked only three cows (Zhou *et al.*, 2002). During the following years, although the overall herd size rose steadily, the average herd size per family rose only gradually (Liu, 2003–2010). In the mid-2000s, more than 80 per cent of dairy cows were owned by small households scattered across the country (Lu and Tao, 2009). Commercialisation pressures and other changes in the production environment have contributed to a decline in the number of dairy farmers since the mid-2000s, even though the total herd size has continued to rise. According to the *China Dairy Yearbook* (Liu, 2003–2010), between 2006 and 2007 the total number of dairy households either fell or was essentially stagnant in Northern China.

To procure, transport and process China's milk, a competitive downstream segment of the dairy industry emerged (Lu and Tao, 2009). Foreign

firms and large corporations, mixed with small-scale local firms, invested in and expanded the capacity of the dairy-processing sector. Although domestic firms such as Sanlu, Yili and Mengniu and foreign dairy giants including Nestle, Fonterra and Danone were most prominent, there were also thousands of other firms. As dairy farming expanded, competition within China's major dairy markets intensified. Several local brands in each of the provinces are very competitive in certain regions because of the short shelf life of fresh milk and other dairy products. During the 2000s, inter-regional competition also became fiercer. As this occurred, dairy firms were pressured to keep costs low, even at the expense of milk quality.

In the aftermath of the 2008 milk scandal in China, the government took action to change the structure of national dairy production. To implement the Production Management Policies, the dairy industry demanded three actions (Hebei Dairy Production Management Policy, 2008). First, village leaders' councils and township governments were supposed to document the location of all dairy cows. Individual households with production in the home (that

6. During the summer of 2008 China's worst food crisis took place when it was discovered that milk suppliers (in this study milk suppliers are defined as traders and milk collection stations, not small dairy farmers) were adding melamine, a colourless crystalline compound, to artificially boost the protein readings of their milk (BBC, 2008, Xinhua News, 2008).

**Table 3.4 Contracting arrangements in apple- and grape-producing villages in Shandong, 2005 (%)**

	Apple villages			Grape villages		
	Formal contract	Oral contract	No contract	Formal contract	Oral contract	No contract
Shares by different contracts	0	0	100	24	5	76
Services provided by buyers						
Seed	0	0	0	10	0	0
Fertiliser	0	0	0	0	0	0
Credit	0	0	0	0	0	0
Extension	0	0	0	5	0	0

Source: Huang *et al.* (2008).

is, operating as back-yard dairy farmers) were supposed to move their cows into approved dairy complexes. In placing dairy farmers and their cows into one *yangzhi xiaoqu* ('cow hotel'), farmers are asked to follow uniform procedures for production and marketing (Mo *et al.*, 2012 forthcoming). The dairy complexes usually provide farmers with better access to the output market (Swinnen, 2009). Importantly, this type of centralised complex is expected to facilitate supervision of the standards of food safety and quality.

The second part of the Production Management Policies was focused on investing in and otherwise assisting the owners and managers of the dairy complexes to expand and modernise their operations (Hebei Dairy Production Management Policy, 2008). To meet these goals, government agencies also offered subsidised loans and gave grants to the dairy complexes. Finally, efforts were made to create linkages between approved dairy buyers, approved processors and the dairy complexes (Hebei Dairy Production Management Policy, 2008). For example, officials often held meetings to sketch out partnerships between the dairy complexes and processors (and buyers).

One of the main goals of the policy response was to change the production structure of China's dairy industry to make it more modern and better able to adopt new technologies that could produce high-quality milk (Hebei Provincial People's Congress, 2009). The new policy aimed to increase the size of dairy farms and reduce the dependence of the sector on small back-yard farms (Chen, 2010). In fact, the Wen government kept its promise of rapid policy response. As previously in China, a crisis led to fast and extensive policy changes.

We surveyed dairy farmers in Greater Beijing before and after the milk scandal. Our data show that in October 2008, one month after the scandal and the initial month of government policies, the proportion of cow-hotel producers rose sharply (Table 3.5). Before the scandal (August 2008) and the month when it was reported (September 2008), only 2 per cent of all 121 dairy households were producing in cow hotels. These self-organised producers evolved into the current type of cow hotels only after the scandal. One month after the scandal, the share of cow-hotel producers increased to 17 per cent. The flow to cow hotels continued after October, but at a slower rate. Consistently, back-yard producers decreased from 98 per cent in August 2008 to only 60 per cent in September 2009. Some of them moved to cow hotels (26 per cent) and others dropped out of dairy production (14 per cent). Among the producers who dropped out, 90 per cent of them sold their cows to other farmers and only 10 per cent decided to slaughter their cows. After the milk scandal, vertical coordination through contracting also started to emerge between the suppliers and the milk-procurement stations (Jia *et al.*, 2011; Luan *et al.*, 2011). As shown in Table 3.6, in 2004, only 11 per cent of dairy farmers contracted with buyers. The share decreased to 9 per cent in 2008, reflecting governance of marketing at the upstream dairy marketing chain before the milk scandal. After the crisis, contracts were widely introduced between dairy farmers and dairy complexes (68 per cent, Table 3.6).

Before the milk scandal, the supervision of food safety and quality at the upstream dairy marketing chain was weak in China. Being poorly supervised, the compliance and supervision of safety and quality standards of milk sold to mobile brokers and milk

stations were very weak. Only half of dairy farmers in the 2004 survey were asked to test for antibiotics (Table 3.7). None of the dairy farmers in our sample reported being tested for somatoplasm or any quality indicators (e.g. fat rate and lacto-protein).

However, after the milk scandal, safety and quality inspections were enhanced significantly. In 2009, 95 per cent of farmers who sold milk to dairy complexes reported that their milk was tested for antibiotic parameters (column 2, Table 3.7). Frequency of quality inspections also increased. For example, 79 per cent of dairy farmers who sold their milk to dairy complexes reported that their milk was tested for fat rate and lacto-protein. Under heavy regulations, both milk stations and dairy complexes gradually strengthened their supervision on safety and quality standards.

Huang *et al.* (2008b) concluded that:

‘it is clear that China’s challenges to the modern supply chain and food safety, then, are great. On the one hand it wants to keep its market accessible to small, poor farmers. In such an environment there are a number of things for

policy makers to do. First, continued management of the market in the current hands-off way is appropriate. Markets at all levels are competitive and food is being provided to the cities in an efficient and inexpensive way. Small, poor farmers are participating. However, when a market is dominated by traders in traditional marketing channels, there is big challenge in meeting the growing demand for food safety. Increased regulation and testing might help, but, if regulations become too strict they might act as a barrier keeping small farmers out of the market. Evidence from the rest of the world shows that the policies which foster cooperatives and more participatory systems of marketing (that is, institutions that keep the farmer involved in the supply chain for longer periods of time) may help to improve the system. An alternative strategy may be to leave the farmer side of the marketing supply chain alone and try to better control those that supply input markets. For example, it could be that more regulation is needed on the production and import sides of the pesticide industry. Such a strategy would be based on the idea of keeping dangerous elements out of the supply chain altogether.’

**Table 3.5** The structure of dairy production in rural villages in the Greater Beijing area before and after the Milk Scandal (August 2008–September 2009)

	Sample size <sup>a</sup>	Backyard producers (%) <sup>b</sup>	Cow hotel producers (%)	Exited the dairy sector (%) <sup>c</sup>
Aug. 2008	121	98	2	0
Sep. 2008	121	98	2	1
Oct. 2008	121	79	17	3
Jan. 2009	121	74	20	7
May 2009	121	65	24	12
Sep. 2009	121	60	26	14

Notes: The dataset used for the dairy project is a panel of townships, villages and households for 2004, 2008 and 2009 that is largely representative of Greater Beijing. In total we have a total of 693 observations (3 years x 231 household-level observations).

a The total sample size is 121, which includes all the households who engaged in dairy production in August 2008.

b The figures in this table are all month-end data.

c Each row of three percentage figures should total 100. All farmers (who were in dairy production before the milk scandal) must be in one (and only one) of the three categories. Some rows sum to 101 or 99 because of rounding.

Source: Mo *et al.* (forthcoming)

**Table 3.6** Written contracts for dairy farmers who sold milk, by sales channel, Greater Beijing, 2004, 2008 and 2009 (%)

	2004	2008	2009
Without contracts	89	91	32
With contracts	11	9	68
Direct consumer	0	0	0
Mobile brokers	1	4	0
Milk stations	10	4	0
Dairy complexes	0	2	68

Note: Data sampling is described in the notes to Table 3.4.  
Sources: Luan *et al.* (2011), CCAP working paper.

**Table 3.7** Safety and quality inspection of milk, by sales channel, Greater Beijing, 2004 and 2009

Primary buyers	Sample	Share of households inspected (%)			
		Safety: antibiotic	Safety: somatoplasm	Quality: fat rate	Quality: lacto-protein
<b>2004</b>					
Direct consumer	6	0	0	0	0
Mobile brokers	24	54	0	0	0
Milk stations	99	56	0	0	0
Dairy complexes	0	n.a.	n.a.	n.a.	n.a.
Not sell	21	n.a.	n.a.	n.a.	n.a.
<b>2009</b>					
Direct consumer	2	0	0	0	0
Mobile brokers	1	0	0	0	0
Milk stations	13	77	8	69	77
Dairy complexes	38	95	24	79	79
Not sell	50	n.a.	n.a.	n.a.	n.a.

Note: Data sampling is described in the notes to Table 3.4.  
Sources: Luan *et al.* (2011), CCAP working paper.



### 3.3 Individual farmers and farmers' cooperatives, including farmers' attitudes to collective action

Internationally, regarding farmer cooperatives and agricultural development, most development economists believe that cooperative arrangements play an important role for emerging economies (Staatz, 1987). This is true in many developing countries, where cooperatives have been shown to help rural households access inputs at lower prices, sell their output and improve production efficiency (Fulton, 1995; Lele, 1981).

The Center for Chinese Agricultural Policy surveyed 2456 villages in 2003. Extracting 380 villages in 2009 that were surveyed in 2003, Deng *et al.* (2010) documented the profile of farmer professional cooperatives (FPCs) in China. According to these data, during the 1980s and 1990s, the exponential increase of FPCs never occurred. FPCs were slow-growing during the early and middle reform years (1980s and 1990s). After FPCs appeared in 1987, the percentage of villages with FPCs rose only marginally from 0.14 in 1990 to 0.64 in 1997. The share of villages that started FPCs increased from 0.6 per cent in 1997 to 5.7 per cent in 2003.

If the 2003 sample is representative of the whole nation, this would imply that in 2003 there were more than 36,000 villages in China with at least one FPC. While the percentage-point estimates are slightly lower, the 2009 survey recorded similar rates of growth in the late 1990s and early 2000s. The most rapid growth of FPCs, however, occurred after 2005. The percentage of villages that had FPCs in China reached 6.7 per cent in 2006 and 10.6 per cent in 2007. The number doubled again between 2007 and 2008, reaching 20.8 per cent in 2008. Assuming that our data can be used to predict point estimates for China, this implies that there were about 133,000 villages that already had at least one FPC in 2008. Because some villages had more than one FPC, the total number of FPCs located in villages reached 208,000 in 2008.

To analyse the nature of the FPCs, Deng *et al.* (2010) looked at who the FPCs served, and what kind of services they provide. As in other countries such as Germany and France, FPCs in many Chinese villages are careful to distinguish between two types of members. Formal members are those who have formally joined a cooperative, and in some cases paid a membership fee (sometimes called a formal membership fee). Informal members are typically more loosely associated with the FPCs, but are often included in many activities.

Specifically, the FPCs located in villages alone (not counting those operating in the county seats) have 23.8 million members (formal and informal). This means that, 9.5 per cent of rural households participated in FPCs in 2008. There also were 9.9 million formal members and 13.9 million informal members in 2008. The estimated number of FPCs is consistent with those of the Ministry of Agriculture (MOA), which reports that in 2008 there were 180,000 registered FPCs. MOA estimates also indicate that there were 24.6 million households participating in FPCs in 2008. According to the MOA, 9.7 per cent of rural households belonged to FPCs, not distinguishing between formal and informal membership.

The most common services provided by FPCs are concerned with production technologies and/or marketing information. The survey results show that 91 per cent of FPCs provided technology and/or marketing information to farmers in 2008. Production technology services include the provision of crop management approaches, breeding techniques, suggestions for pest and disease control, and animal disease prevention and control. Marketing information services include the provision of information about prices and access to marketing channels. Many FPCs have also begun to provide marketing services for both inputs and outputs.

Although not every FPC provides all types of services for their members, nearly half (49 per cent) of FPCs did help arrange for the purchase of agricultural inputs. By far the most common input-procurement service includes the supply of fertilisers (for crops) and feeds (for animals). In some cases, the FPCs were also involved in the provision of pesticides and seeds. The data also demonstrate that more than half of FPCs were engaged in the provision of output-marketing services. About one fifth of the FPCs, ranging from 10 per cent of the sample villages in Sichuan Province to 29 per cent of the sample villages in Hebei Province, purchased agricultural outputs from their members. In many cases, the FPC would then resell the output of the FPC members to some outside purchasing agents.

In order to evaluate farmers' attitudes to FPCs, we collected information from labourers at two age cohorts in each rural household surveyed. One cohort was 15–24 years old, and the other is their parents who are the heads of the small farms, with the average age of 47.5 years. The survey covered four provinces and was conducted in the autumn of 2011. The block of three questions

asked respondents: if they would like to join an FPC; whether an FPC could help them in marketing agricultural products; and if FPCs can help smallholders to expand agricultural production.

The survey results from 910 households are presented in Table 3.8. Overall, the farmers' attitudes to FPCs is neutral. Around half of the farmers gave positive answers to all three questions. It seems that male farmers are more disposed than female farmers towards FPCs, as the overall proportion giving positive answers by males is nearly 10 percentage points higher. Our results also indicate provincial effects in the smallholders' attitudes to FPCs. More farmers in Shaanxi and Qinghai provinces rely on FPCs in organising agricultural production and selling products in markets than those in Guangdong and Hebei provinces. We cannot explicitly identify the reason for the significantly different opinions about FPCs because of differences in the nature of local cooperatives and in the characteristics of small-scale farmers and/or farms.

In our survey, attitudes to FPCs, while similar overall, vary statistically and significantly between subgroups of respondents (Table 3.8). First, when looking at age effects, the parents are more likely than the young people to rely on FPCs in production and marketing. More than three-quarters of the parents are willing to join FPCs, while only 33 per cent of the youth are. Asked about their attitudes to the roles of FPCs in production and marketing, around two-thirds of the parents, in contrast to around 40 per cent of the youth, gave positive answers.

Secondly, controlling for provincial effects, the results show that attitudes to FPCs are similar between the male and female youth labours, and show different gender effects among the parents to some extent. Regarding the functioning of FPCs in selling products and expanding farm scale, the proportion of male, older farmers responding positively is more than 10 percentage points higher than that of the female counterparts. However, more than 75 per cent of both female and male older respondents are likely to join FPCs.

**Table 3.8 Farmers' attitudes to farmer professional cooperatives (FPCs), 2010**

The proportion of labourers (%)	Total			The youth (aged 15–24)			Head of household		
	M+F	Male	Female	M+F	Male	Female	M+F	Male	Female
<b>Who would like to join FPCs</b>									
All	55.3	57.8	49.8	33.4	33.2	34.7	77.1	77.3	76.6
Guangdong	45.5	50.5	23.9	30.1	34.9	20.0	61.0	61.5	50.0
Shaanxi	63.7	71.3	44.4	35.8	42.1	26.3	91.6	92.4	87.5
Qinghai	65.5	63.8	69.5	53.0	45.8	63.4	78.0	76.8	83.3
Hebei	50.7	49.3	52.4	20.4	15.4	27.1	81.0	87.1	74.6
<b>Who believe FPCs help them to expand agricultural production</b>									
All	51.4	55.0	43.5	40.4	40.4	40.5	62.4	66.7	48.6
Guangdong	41.9	46.0	23.9	30.1	34.9	20.0	53.7	53.9	50.0
Shaanxi	66.8	72.8	51.9	55.8	59.7	50.0	77.9	82.3	56.3
Qinghai	66.5	66.0	67.8	62.0	54.2	73.2	71.0	74.4	55.6
Hebei	38.3	40.5	35.7	23.4	21.8	25.4	53.3	61.4	44.8
<b>Who believe that FPCs help them to sell agricultural products</b>									
All	54.6	57.8	47.7	42.6	43.0	42.1	66.6	69.5	57.1
Guangdong	46.3	50.5	28.3	33.3	37.4	25.0	59.4	59.8	50.0
Shaanxi	71.1	77.2	55.6	55.8	61.4	47.3	86.3	88.6	75.0
Qinghai	68.0	68.1	67.8	63.0	55.9	73.2	73.0	76.8	55.6
Hebei	40.9	39.9	42.1	27.0	25.6	28.8	54.7	55.7	53.7
<b>No. of observations</b>	<b>910</b>	<b>625</b>	<b>285</b>	<b>455</b>	<b>348</b>	<b>107</b>	<b>455</b>	<b>277</b>	<b>178</b>

Notes: The survey were conducted in four provinces: Guangdong, Shaanxi, Qinghai and Hebei. After data cleaning, there are 910 households used in this study.

Source: Authors' own survey, 2011.

Thirdly, we further divide the farmers by provinces. Combined with gender and age effects, our results indicate that there are significant variations in farmers' attitudes to FPCs across provinces. Within the young farmers group in Shaanxi and Qinghai, more than half of them confirm positive impacts of FPCs in production and selling products. Furthermore, in Qinghai, more than 60 per cent of the female youth farmers show an optimistic attitude about joining FPCs, and the positive proportions increased by an additional 10 percentage points on the roles of FPCs. Among the parents, there is a wider positive attitude towards FPCs among farmers in Shaanxi and Qinghai provinces. The older female farmers in Qinghai, like the youth, are more likely to join FPCs than their male counterparts.

From our study, it is clear that FPCs have been appearing gradually on the landscape of rural China since the late 1990s. Moreover, our data show that the new FPCs are providing most of the services that cooperatives provide to farmers in other countries, such as accessing inputs and technology, and assistance in marketing output. The only service that is absent that has been thought to be important elsewhere is credit; China's FPCs provide little in the way of credit to their members.

While there has been significant growth, FPCs are still present in only a small share of China's villages. While there are many factors that may explain why some villages have FPCs and others do not, it is clear that the role of the government is of primary importance (Deng *et al.*, 2010). Policy support measures after the new legal setting in China, since the 2006 FPC law, account for most of the growth of FPCs. This makes sense, since rural China is still a place in which the economy is made up of millions of small farmers, traders, businesspeople and other atomistic actors. Without an alternative form of organisation that can promote FPCs, the government's role has been key in the past, and seems likely to remain so.

Furthermore, our results show significant variations in farmers' attitudes to FPCs among different groups categorised by age cohort, gender and provinces. These suggest that, given the emerging feminisation and aging in Chinese agricultural production, the functioning of FPCs should be more targeted to female and older smallholders. The services of FPCs should be improved to meet the demands of farmers in organising production more efficiently and helping them link to the development of modern supply chains in China.

Our survey results also raise concerns about far less positive attitudes among young people on participation and their expectations from FPCs.

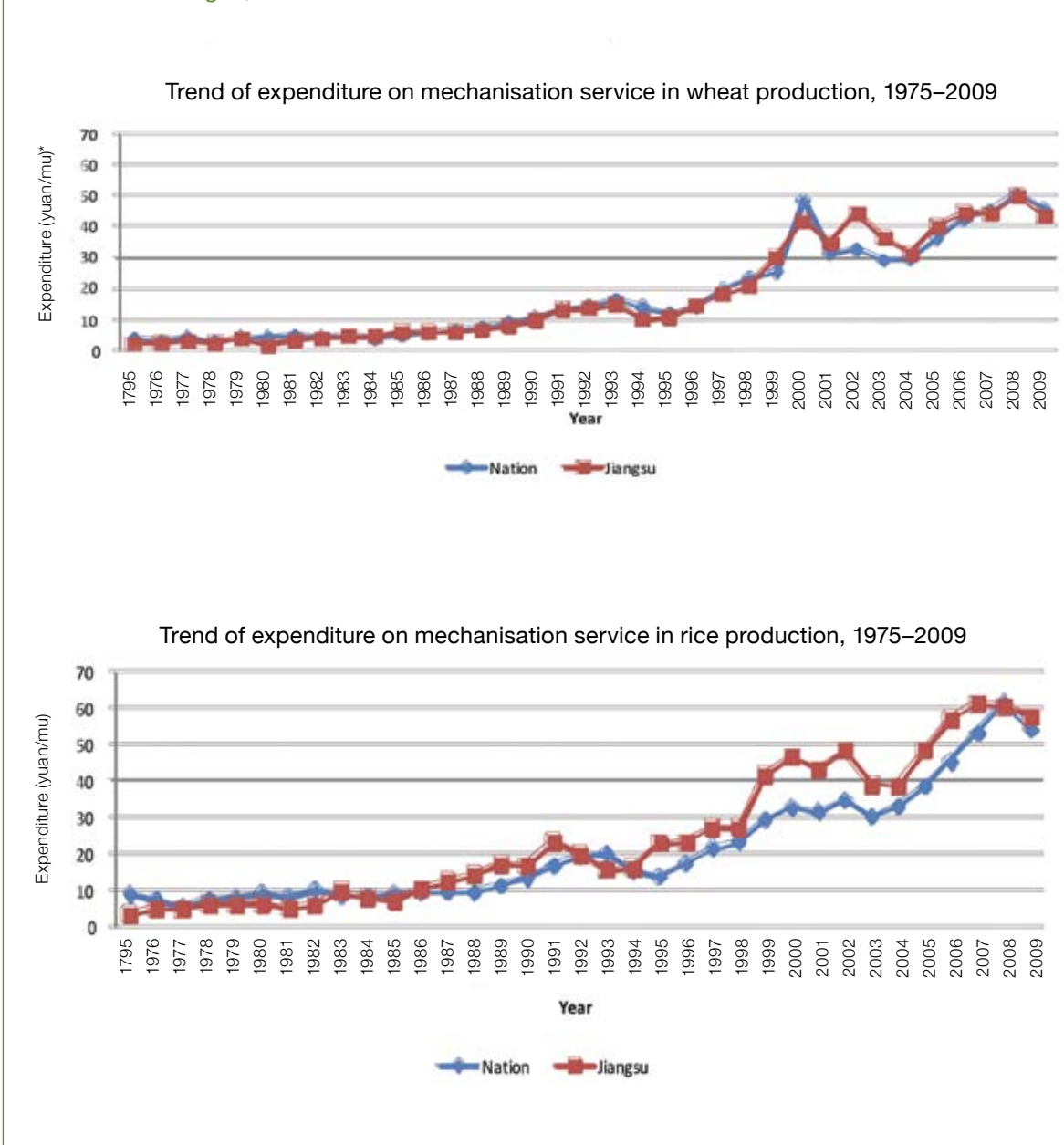
### 3.4 Producer perspectives on farming

When reviewing the process of applying labour-saving innovation in agriculture, it is generally assumed that this can be achieved through substituting mechanical engineering technology for labour inputs (Hayami and Ruttan, 1985). This, in turn, helps to save more labour time for other activities, and creating other sources of income, as well as changing the composition of labour inputs by gender in production.

Initially, promoting appropriate mechanisation in Chinese agriculture dated back to the collective system before 1978. Even though this collective campaign was blamed for inefficiency in motivating production and causing other adverse social effects, certain remarkable achievements have been identified (Lin, 1990; 1992). Specifically, the agricultural machinery stations at the different administrative levels were established to provide machinery services at planned prices. Projects were designed for mechanical operation including sowing, cultivating and reaping within communes equipped with large or medium-sized machines, especially tractors. This institutional system also facilitated mutual aid among neighbouring households in operating small motorised farming machines in peak season. The network also proved effective in mobilising massive rural labour forces in building and maintaining large irrigation systems. As a result, the areas of mechanical operation and irrigation increased gradually, and additional irrigated area came from powered irrigation instead of the traditional gravity system (Ji *et al.*, 2012; Wang *et al.*, 2007).

The pattern of mechanised agricultural production in China changed completely during the early period of rural reform. On implementation of the Household Responsibility System, large and medium-sized machines like tractors and harvesters could not be divided between households. Therefore, they were shared in a production team or managed by a committee of village leaders. However, mechanical operation declined rapidly because households seek to save on operation costs and prefer to use draft animals for timely cultivation. Further, the small area of each farm's cultivated land on several fragmented plots is another constraint on demand for mechanisation (Fleisher and Liu, 1992). The irrigation systems in some areas lie abandoned because of lack

**Figure 3.3** Expenditure on mechanisation services in rice and wheat production nationally and in Jiangsu, 1975–2009



Note: All of the value terms are at 2002 constant prices. 1 mu = 1/15 hectare.

Source: Wang *et al.* (2012).

of maintenance and decreased investment in irrigation engineers by households.

However, combined with other liberalisation policies in favour of off-farm employment, especially migration (see Section 3.5), Chinese small-scale farmers creatively solved the problem of mechanical practice in production. From the demand side, experiences in developed countries show that the process of mechanisation is driven by changes in relative prices, particularly the wage rate of off-farm labour. China is no exception. The

empirical studies by Cai *et al.* (2008) and Wang *et al.* (2011) confirm the official statistics shown in Figure 3.3. The costs of wages for migrants – an important component of the labour force – increased rapidly from the late 1990s. This increased the demand for mechanical operation in eliminating the shortage of labour bottlenecks in peak season due to more migration to urban or suburban areas.

From the supply side, we explored the provision of mechanisation services in a portfolio of custom

services from two dimensions. In one dimension, the current theoretical and empirical evidence identifies the correlation between investment in agricultural production, in particular production machines, and migration (Taylor *et al.*, 2003; de Brauw and Rozelle, 2008; Ji *et al.*, 2012). This suggests more mechanical operation in place of labour to maximise households' utility. In the other dimension, the mechanisation service largely evolved spontaneously in response to the demand and underlying economic forces (Liu and Wang, 2005) in two forms of practice. First, mechanical services are provided by mechanical operation teams, who own the large machines. Because agricultural production is still managed by smallholders, the team generally set up a contract orally or in writing with all the households who own one or several plots of land in a certain area. Households who are able to operate the machines, can obtain them from farming equipment rental markets.

We used data collected by the Center for Chinese Agricultural Policy in rice and wheat production in Jiangsu province from 2002, 2006 and 2010 to analyse the evolution of mechanisation services and labour input. The results are presented in

Tables 3.9 and 3.10. Table 3.9 presents descriptive statistics of mechanisation services in the units of yuan/mu and days/mu in Jiangsu, separately for rice and wheat production in 2002–2010.

Our results indicate that mechanisation services overall appeared to expand in both rice and wheat production, with increased use of tractors, threshers, harvesters and irrigation machines. The expenditure on mechanical services at 2002 constant prices increased on average at the yearly growth rates of 5.5 and 7.5 per cent for rice and wheat, respectively, from 2002 to 2010. Our results are consistent with the official statistics in Figure 3.3, reflecting the increased trend of mechanical operation not only in the rich regions like Jiangsu but across China as well.

Here, we cannot explicitly identify the causality between the substitution of mechanical operation and labour input. However, combined with the statistics on the variation of labour inputs in Table 3.10 and Figure 3.4, our results indicate the correlation of the expansion of mechanisation services with the reduction of labour inputs in a unit of cultivated land. The results show that the reduction of labour inputs occurred in both rice and wheat production in the complete process,

**Table 3.9** Mechanisation services in rice and wheat production, Jiangsu province, 2002–2010

	Rice			Wheat		
	2002	2006	2010	2002	2006	2010
<b>Total services (yuan/mu)*</b>	<b>65.88</b>	<b>93.66</b>	<b>100.91</b>	<b>46.54</b>	<b>80.94</b>	<b>84.20</b>
-tractor	26.38	26.90	33.41	24.45	26.76	32.46
-thresher	2.53	2.05	0.10	0.76	1.21	0.00
-harvester	42.37	45.28	50.71	42.09	44.43	45.01
-irrigation machine	17.98	17.81	14.23	5.58	7.42	4.86
-transportation	0.51	0.43	1.49	0.36	0.23	1.40
-other	0.31	0.57	0.00	0.50	0.19	0.00
<b>Total services (days/mu)</b>	<b>0.83</b>	<b>0.58</b>	<b>0.66</b>	<b>0.27</b>	<b>0.32</b>	<b>0.37</b>
-tractor	0.13	0.13	0.20	0.11	0.14	0.17
-thresher	0.21	0.15	0.01	0.01	0.02	0.00
-harvester	0.07	0.11	0.16	0.09	0.10	0.14
-irrigation machine	0.41	0.28	0.32	0.05	0.06	0.09
-transportation	0.02	0.02	0.02	0.01	0.01	0.01
-other	0.01	0.01	0.00	0.01	0.01	0.00

Notes: These data are from a household survey in Jiangsu province in 2002, 2006 and 2010. The sample is based on a multi-stage and random cluster process. In Jiangsu province, two counties were randomly selected using a probabilistic proportion-to-size sampling method; then one township in each county and two villages in each township were selected randomly using the symmetric systematic sampling method based on grain yield in the county and the village. We then used household rosters to choose 40 households at random in each village.

1 yuan = approximately USD 0.15; 1 mu = 1/15 hectare

Source: Wang *et al.* (2012).

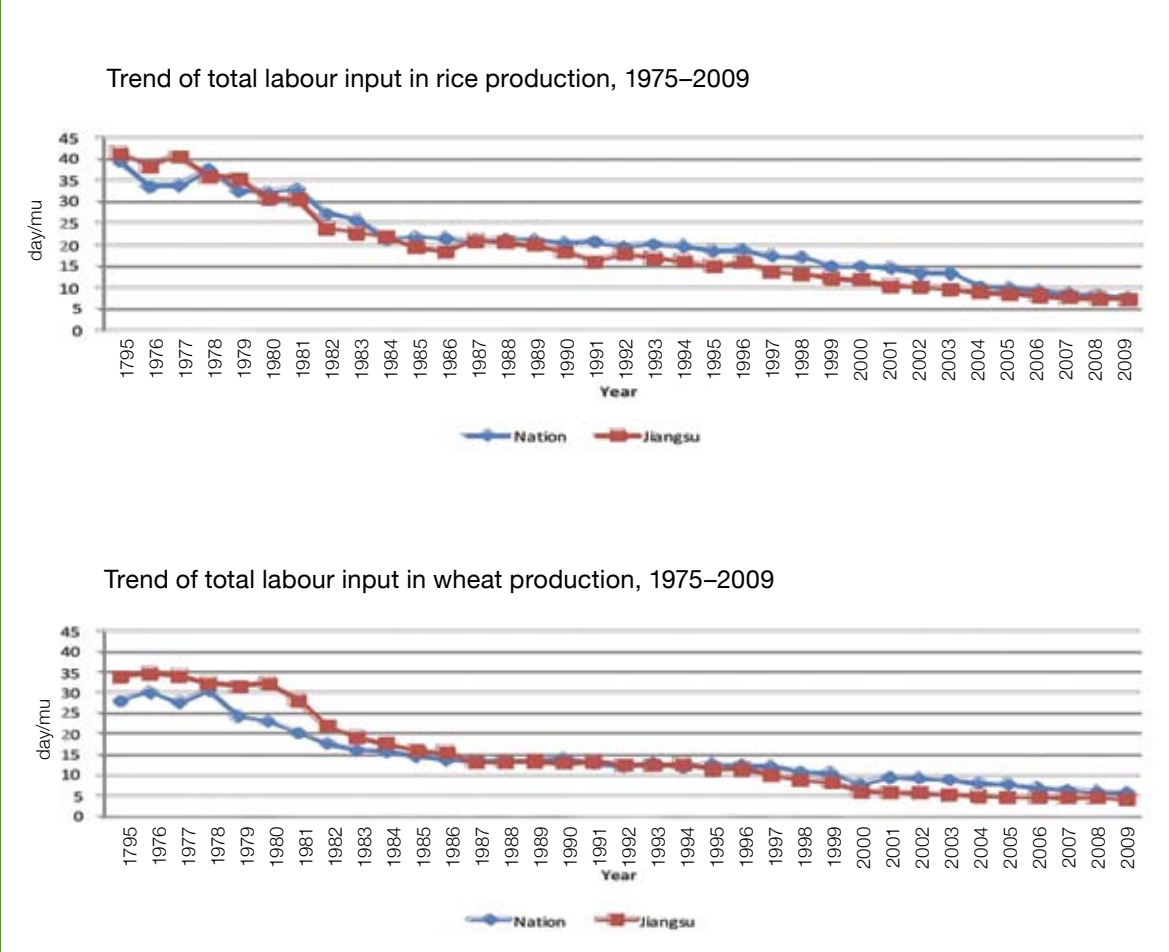
except for spraying pesticide and weeding. The substantial reduction of labour inputs appears in sowing and harvesting, which could be mainly conducted by machine.

This dataset also facilitates analysis of the shift of labour inputs in agricultural production, with special attention to gender effects. When disaggregating the labour inputs by gender, our results show that female labour on average dominated in both rice and wheat production from 2002 to 2010, except in 2010 for wheat production. Furthermore, our results indicate more working days of female labour in various activities including sowing, spraying pesticide and weeding. Even though the results show a reduction of labour inputs from both male and female labourers, we conclude that there

appears to be an increasingly female involvement in Chinese agricultural production in the 2000s. While our results are limited to only one developed province in China, we would expect similar trends in other regions in the near future.

Experience of Chinese agricultural production presents two salient characteristics. One is the adoption of mechanical operation either through customers' services or by households' own labour, even on small farms. This expansion is highly correlated with the evolution of off-farm employment, given the increased opportunity cost of on-farm working. The other is a feminisation of smallholder production, as growing numbers of rural women become the principal farmers (deBrauw *et al.*, 2008).

**Figure 3.4** Labour input in rice and wheat production nationally and in Jiangsu, 1975–2009



Source: Wang *et al.* (2012).

**Table 3.10** Labour inputs by gender in rice and wheat production in Jiangsu province, 2002–2010

(days/mu)	Rice			Wheat		
	2002	2006	2010	2002	2006	2010
<b>Total Labour</b>	<b>17.06</b>	<b>14.70</b>	<b>12.46</b>	<b>5.96</b>	<b>6.32</b>	<b>4.88</b>
-male	6.16	6.12	5.79	2.64	2.87	2.61
-female	10.05	7.76	6.42	3.26	3.24	2.18
-hired	0.86	0.82	0.25	0.06	0.21	0.09
<b>Labour in plowing+base fertilizer</b>	<b>1.65</b>	<b>0.95</b>	<b>1.05</b>	<b>0.80</b>	<b>0.82</b>	<b>0.65</b>
-male	0.68	0.46	0.50	0.47	0.42	0.33
-female	0.25	0.36	0.30	0.33	0.37	0.30
-hired	0.00	0.02	0.01	0.00	0.02	0.01
<b>Labour in sowing+transplanting</b>	<b>5.50</b>	<b>4.58</b>	<b>2.98</b>	<b>0.55</b>	<b>0.85</b>	<b>0.76</b>
-male	1.63	1.83	1.23	0.22	0.37	0.40
-female	3.45	2.19	1.62	0.33	0.47	0.34
-hired	0.41	0.56	0.13	0.00	0.01	0.02
<b>Labour in fertilizing</b>	<b>1.12</b>	<b>1.29</b>	<b>0.93</b>	<b>0.63</b>	<b>0.79</b>	<b>0.53</b>
-male	0.43	0.82	0.38	0.29	0.46	0.23
-female	0.69	0.83	0.55	0.35	0.50	0.30
-hired	n.a.	0.04	n.a.	n.a.	0.04	n.a.
<b>Labour in irrigating</b>	<b>0.40</b>	<b>0.73</b>	<b>0.58</b>	<b>0.08</b>	<b>0.11</b>	<b>0.09</b>
-male	0.32	0.77	0.44	0.07	0.12	0.06
-female	0.09	0.54	0.12	0.01	0.11	0.02
-hired	0.00	0.07	0.03	0.00	0.00	0.00
<b>Labour in pesticide+weeding</b>	<b>2.90</b>	<b>3.34</b>	<b>3.84</b>	<b>1.23</b>	<b>1.30</b>	<b>0.76</b>
-male	0.60	1.46	1.64	0.36	0.64	0.40
-female	2.30	1.86	2.21	0.87	0.64	0.36
-hired	n.a.	0.02	n.a.	n.a.	0.03	0.00
<b>Labour in harvesting+ threshing</b>	<b>5.29</b>	<b>2.04</b>	<b>2.32</b>	<b>2.48</b>	<b>1.53</b>	<b>1.57</b>
-male	2.42	0.89	1.16	1.15	0.68	0.82
-female	2.67	1.03	1.11	1.28	0.74	0.70
-hired	0.21	0.12	0.06	0.05	0.11	0.04

Note: Data sampling is described in the notes to Table 3.9.  
Source: Wang *et al.* (2012).

### 3.5 Off-farm employment and migration: gender and age effects

Rural labourers are constantly seeking to diversify their time allocation into alternative income-generating activities to improve their welfare throughout their working life. The opportunities to move into off-farm income generation dominate economies increasingly during the process of industrialisation and urbanisation (Kuznets, 1941). Development in many respects is defined by the transformation of the labour force – from agricultural to non-agricultural (Huffman, 1991), and from rural to urban (Zhao, 1999).

The rise of off-farm labour employment for the rural population was one of the most important indicators of China's development during the 1980s and 1990s. According to the 2000 China National Rural Survey only 15 per cent of individuals in the rural labour force had a job off the farm in the early 1980s. By 2000, the corresponding share was 45 per cent (Figure 3.5a). With a rural labour force exceeding 500 million, this means that in 2000 more than 218 million individuals were working full- or part-time off the farm. These figures are also consistent with data from other sources (Giles, 2006; NSBC, 2001; Glauben *et al.*, 2008).

If there were any concerns in 2000 about whether off-farm labour employment would continue in the 2000s, data from our 2008 China National Rural Survey in six provinces should allay those fears. The upward trend in the share of individuals in the rural labour with off-farm employment continues (Figure 3.5a). From 45 per cent in 2000, 62 per cent of the rural labour force was working off the farm in 2008. This means 310 million members of the rural labour force were fully or partially employed off the farm in 2008. These data, which are also consistent with trends from national sources (e.g., NSBC, 2009), show that the transformation is well underway of the rural labour force, from one dominated by individuals working on farms to one mostly made up of individuals engaged in non-farm jobs.

Although growing fast between 2000 and 2008, rural off-farm employment trends were different for men and women, and the access gap by gender still exists but has narrowed. The share of rural men working off the farm rose 27 percentage points (from 47 to 74 per cent) between 2000 and 2008 (Figure 3.5b). The share of women also rose 27 percentage points, although from a lower base (from 19 to 46 per cent). In absolute numbers of

workers, this means that there were 87 million more men and 69 million more women working off the farm in 2000 than in 2008. Thus, while the growth of women's off-farm employment was robust, it still lags behind that of men.

While the rate of growth of off-farm employment before and after 2000, in general, has remained steady across the two waves of the China National Rural Survey, disaggregating the employment figures into wage-earning and self-employment demonstrates that the composition of rural off-farm employment changes sharply around the year 2000 (Figure 3.6a). Our data also show that the rise in wage-earning was paralleled by the rise in self-employment, consistent with Zhang *et al.* (2006) and Wang *et al.* (2011a). Between 1982 and 2000, wage-earners rose from 10.2 per cent of the rural labour force to 28 per cent, an increase of 18 percentage points. During this same period, self-employment rose from 4.8 to 18 per cent, an increase of 13 percentage points. The almost parallel increase in off-farm employment in both of these employment categories shows how both wage-earning and self-employment played important roles in the transformation of rural labour markets before 2000. The importance of self-employment might be surprising to many observers, given the large increase in the demand for wage-earning labour in the manufacturing facilities that opened in the coastal areas and around cities. However, as discussed in Zhang *et al.* (2006), the lack of development of the service sector (and other sectors, such as housing construction, which required many self-employed/custom contractors) also provided many opportunities for rural individuals to start their own micro/nano firms.

Though more diverse occupations were available for rural labourers with the expansion of the wage-earning sector and the evolution of self-employment before 2000, the participation choices of male and female labourers were different. Male labourers were heavily involved in both the wage-earning and self-employed sectors, while the proportion of female labour in either waged labour or self-employment in 2000 was around the same as the proportion of male labourers in these sectors two decades before. (Figures 3.6 and 3.7b). Within the wage-earning sector, the gap of participation rates between male and female labourers has widened from 12 to 23 percentage points. The difference between male and female labourers running self-employment enterprises was stagnant at 5–6 percentage points before 2000.



After 2000, following trends quite different from the general off-farm trend described above (which continued largely at the same pace before and after 2000), there are noticeable breaks in the trends in the individual components of off-farm employment by gender. According to our analysis, the share of female labourers in wage-earning and self-employment before 2000 rose at a rate of 0.81 and 0.26 percentage points per year. However, the analysis also shows structural breaks in the two sets of female employment. Our results suggest that female employment in wage-earning and self-employment accelerated after 2000.

Cohort analysis can illuminate the source of the trends. In the 1990s, according to deBrauw *et al.* (2002), the expansion of off-farm employment was mainly driven by the entrance into the labour force of individuals in the younger cohorts (Table 3.11). For example, when looking at cohorts of workers in 1990, only 24 per cent of rural labourers aged 16–20 years had a job off the farm. This number was similar for other age cohorts. However, by 2000, this figure had nearly tripled for these younger age cohorts. For example, 71 per cent of the labourers in the 16–20 year-old cohort had a job off the farm in 2000, as were 77 per cent of the 21–25 year-old cohort and 59 per cent of the 26–30 cohort. In contrast, the rise in the share of older cohorts working off the farm was smaller. Of those aged 41–50, for example, those working off the farm rose from 21 per cent in 1990 to 41 per cent in 2000; the share of those in the 51–64 cohort went from 12 per cent in 1990 to 25 per cent in 2000.

There are considerable differences in employment rates between male and female labourers (Table 3.11). For the youngest age cohort (16–20), the participation rate of female labour was higher than that of their male counterparts in 2000: 73 versus 68 per cent. Of all those aged over 25, however,

the share of men in off-farm employment was more than double that of women in each age cohort.

In part because employment rates were so high for the younger cohorts by 2000, between 2000 and 2008 the rise in off-farm employment (in general) is more evenly distributed among the cohorts (Table 3.11, columns 2 and 5). While the share of those of age with a job off the farm rose by 14–27 percentage points between 2000 and 2008 in the 16–35 cohorts, the rise in the 36–65 cohorts was 13–19 percentage points.

The overall off-farm employment rate increase between 2000 and 2008 among age cohorts hides sharp differences according to gender (Table 3.11). The descriptive statistics reveal the fact that the increase in off-farm employment is mainly driven by the younger female workers, under 35. The participation rate of those aged 26–30, 31–35, 41–50 has doubled, and the rise in other cohorts rose between 9 and 24 percentage points.

Differences in the rise of participation by cohorts between 2000 and 2008, while similar for overall off-farm employment, vary when looking at wage-earning and self-employment (Table 3.12). In the case of younger cohorts (16–35), there is a much larger increase in participation in the wage-earning migration subsector than in the self-employment subsector. For example, individuals in the younger cohorts increased their participation in the wage-earning migrant subsector from 21 to 31 percentage points. In contrast, the participation of these younger cohorts in self-employment fell (with the fall concentrated in the 21–25 cohort – by 7 percentage points; and the 26–30 cohort – by 4 percentage points).

The trends among the older cohorts differed between off-farm employment subsectors (Table 3.12). Individuals in the older cohorts (36–65)

**Table 3.11** Off-farm employment by age cohort and gender (%), 1990, 2000 and 2008

Age cohort	1990	2000		2008			
	Total	Total	Male	Female	Total	Male	Female
16–20	24	71	68	73	88	91	84
21–25	34	77	84	68	91	92	84
26–30	29	59	80	35	86	92	70
31–35	27	56	78	30	75	89	58
36–40	21	50	71	29	69	87	53
41–50	21	41	61	21	59	76	44
51–64	12	25	33	12	38	52	21

Note: Data sampling is described in the notes to Table 3.1  
Source: Wang *et al.* (2012).

marginally increased their participation in self-employment (unlike younger cohorts, whose participation in self-employment fell). At the same time, the increase in wage-earning migration rose less among older than younger cohorts.

To pinpoint who was involved in wage-earning and self-employment, we further illustrate off-farm employment by gender combined with age cohorts between 2000 and 2008. Within wage-earning, the proportion of male and female labour in all of the cohorts has increased considerably. The participation rate of male labour in the age cohorts younger than 36 years old and aged 41–50 increased by around 20 percentage points; participation of the other two age cohorts (36–40 and 51–64) increased by around 15 percentage points. Even the higher participation rate of female labourers aged 16–20 increased by almost 8 percentage points. Similar to male labourers aged 21–35, the proportion of female labour earning wages also increased by more than 20 percentage points. For the cohorts older than 35 years, the participation rates tripled between 2000 and 2008. However, we should note that, since the participation rates of almost of all male labour,

except those over 50 years old, and females younger than 30, are higher than 50 per cent, any further increase in wage-earning employment will be driven only by female workers over 30 years old.

Within self-employment, the changes in participation by men and women appear in opposite directions for the age cohorts below 50 years. The share of men running self-employed enterprises either dropped by 8–10 percentage points (ages 21–30) or roughly kept constant (16–20, 31–50). The proportion of men aged 51–64 running firms increased by 5 percentage points between 2000 and 2008. However, the proportion of women in all age cohorts, except 21–25, running self-employed enterprises increased by 2–7 percentage points.

One of the characteristics of self-employment is that it does not necessarily compel an individual to give up working on the farm or earning a wage, as in the case of the village leaders. This is especially true in 2000 (Table 3.11); however, new evidence shows that Chinese rural male and female workers specialise in self-employment. The percentage of workers only running firms increased by 21 and 10 percentage points for male and female labour, respectively.

**Table 3.12** Rural labourers employed in wage-earning and self-employment by gender and age cohort (%), 2000 and 2008

	2000			2008		
	Total	Male	Female	Total	Male	Female
<b>Wage-earning</b>						
<b>Age cohort</b>						
16–20	64.8	60.2	69.8	81.6	85.1	77.6
21–25	56.8	59.2	54.0	78.1	79.0	76.9
26–30	38.8	53.0	22.4	68.1	73.5	52.9
31–35	31.0	44.4	15.0	53.0	63.8	36.1
36–40	27.1	44.2	10.2	44.2	59.0	29.2
41–50	20.1	31.7	8.3	39.4	52.3	25.7
51–64	12.8	18.7	3.6	22.7	32.8	10.9
<b>Self-employment</b>						
<b>Age cohort</b>						
16–20	6.5	8.3	4.6	7.9	7.3	8.6
21–25	20.2	25.1	14.4	14.3	17.3	10.5
26–30	22.1	29.9	13.1	18.9	19.6	17.1
31–35	25.9	34.8	15.2	26.9	30.0	22.0
36–40	25.2	31.2	19.3	28.6	32.0	25.1
41–50	23.1	32.7	13.3	25.7	31.3	19.7
51–64	12.9	15.8	8.3	16.0	20.7	10.5

Note: Data sampling is described in the notes to Table 3.1  
Source: Wang *et al.* (2012).

### 3.6 Wage rates, increasing wage-earners and stagnation of male self-employment

In this section we explore one of the possible determinants of the pre- and post-2000 trends for wage-earning and self-employment in rural China's labour market. To do so, we adopt a three-step process. First, we characterise the individual's decision-making calculus. From this, we see that if we want to explain differences in occupational choice trends over time that it is important to be able to track changes in the level and variability of wages and earnings. Therefore, in the second part of this section we examine the record of wage rates over the study period, showing that the wage rate trends (discussed in this section) seem to be highly correlated with the trends of observed occupational choices (discussed in Section 3.5).

The conceptual basis for decision making on which this analysis rests is from Woodruff (2006) and can be summarised as follows. We assume that individuals in the labour market are endowed with some innate entrepreneurial ability. We also assume that they prefer more income to less but are also concerned with controlling the amount of risk that they face. Hence, in making the wage-earning or self-employed decision, they initially compare the level of the wage offered by the employer for the job with the earnings that can be gained from self-employment. Simultaneously, there is an assessment of the variability of the expected earnings stream.<sup>8</sup> In the final analysis, since individuals in the labour market are assumed to be trying to maximise their income subject to reducing their risk, there should be expected to be a trade-off between the hourly wage/earnings and the variability of the wage/earnings.

Of course, not all individuals are alike – even if they are competing in the same labour market – which is important to allow for, since we see individuals choosing different activities in the same economy. The marginal return to self-employment varies according to systematic variations in earning potential and endogenously determined self-employer's entrepreneurial abilities (which themselves vary with such characteristics as education, age and work. Because of this heterogeneity, there is a different minimal level of compensation (holding risk constant) required

by different individuals which will induce them to switch from being self-employed to a wage-earner (and vice versa). In addition, the wage rate of wage-earners in turn will determine the ability level of the marginal self-employer who is just indifferent between self-employment and wage work. Although this (the quality of the individuals in the self-employed sector) is not observable, it may affect the quality of the self-employed activities (higher-quality services with more predictability or less probability of losses).

What are the predictions from this conceptualisation of the occupational choice process? There are several. First, it is clear that if wages are rising (and employment, as we assume is fairly accessible), we should expect more people to be choosing to work in the wage-earning sector. To the extent that there is more work in China's coastal provinces and large cities, we should expect more rural individuals to choose the wage-earning subsector. Second, if wages are rising, we should expect that there will be those in the self-employed subsector who will choose to shift to the wage-earning subsector. Third and finally, since those left in the self-employed subsector, according to the conceptualisation, should have higher entrepreneurial ability, we should expect either their earnings to rise (subject to competition in the sector) and/or their level of risk to fall.

The 1980s and 1990s was a period of stagnant wages in China (Fleisher and Wang, 2005). Although there were few good studies of wages during the pre-2000 period, using information on wages from the few true panel datasets that do exist clearly shows that the real wage was relatively stable in the 1980s and 1990s. The rise of the real-wage rate between 1988 and 1995 in the CHIPS data set (Riskin *et al.*, 2001) was only 5 per cent in total. According to data from the CHNS dataset from the late 1980s to the late 1990s, when adjusting the unskilled wage rate by the rural CPI, there is virtually no rise. Using the Jiangsu Loop Survey between 1988 and 1996, Rozelle *et al.* (2002) showed that a real unskilled wage rose less than 1 per cent per year. According to official data collected by the National Bureau of Statistics, China and compiled by Cai and Wang (2010), there is only a negligible rise in the wage rate during the 1990s.

8. There is almost certainly also an assessment of the likelihood of becoming unemployed in the wage-earning migrant subsector, as well as the likelihood of not being able to find customers or contracts in the self-employed sector. Given the rapid growth in China's economy, at least in the short run, these risks are probably less important. If one job (or contract) ends, there are almost certainly other possibilities. Of course, there are smaller earnings during the periods of search and job-switching/client-hunting. But, this, at least in part, is accounted for in our analysis by the variability in the hourly earnings of the wage-earning migrant and self-employed.

After 2000, however, the story is fundamentally different. Cai *et al.* (2008) have shown the acceleration of wages during the post-2000 period when compared to the 1980s and 1990s. Their paper reports that real wages rose at a rapid rate (14 per cent per year) after 1998. Cai and Wang (2010) cite the rapidly rising wage in the 2000s and interpret the findings as showing that after 2000 China entered a period of development when the growth rate of the unskilled wage rate shifted from relatively flat to rapidly rising.

According to our data also, real wages rose between 2000 and 2008 (Table 3.13). In 2000, the hourly earnings of a rural working individual engaged in unskilled wage-earning work was 3 yuan. By 2008, the hourly wage (in real terms) for the same individuals who were working in the same jobs at the same tasks was 5.4 yuan. Hence, in our sample the real hourly unskilled wage rate rose by 7.7 per cent per year between 2000 and 2008.<sup>9</sup>

Our data also show that during the post-2000 period, male labour, on average, out-earns the female counterpart; the gender impact on wage also indicates that the real hourly wage by gender grows at different rates, even though the overall real hourly wage increased at the accelerated rate

(Table 3.13). The hourly earnings of a rural male in unskilled wage-earning work increased from 3.2 to 5.9 yuan between 2000 and 2008, at a yearly growth rate of 7.9 per cent. The difference in the hourly earnings of a male and female rural worker widened from 0.7 yuan in 2000 to 1.7 yuan in 2008. This is mirrored in the evidence that the yearly growth rate of hourly earnings of a rural female was 6.7 per cent, which is 1.2 per cent lower than that of a male counterpart between 2000 and 2008.

China's economy has maintained its high annual GDP growth rate for more than two decades. In 2009, GDP per capita reached nearly US\$4000 (NSBC, 2010). In the past decade (after several decades of stagnation), China's unskilled wage rate appears to be finally rising at a rate nearly equal to that of GDP. Our results show that self-employment, an occupation dominant in the 1980s and 1990s, has begun to stagnate. The self-employed share of the rural labour force is falling and this is at least partly due to the narrowing earnings – wage gap that has occurred as the wage rate rose during the 2000s. Migration has surpassed self-employment as the number one subsector for employment of the rural population during the past several years. As long as wages continue to rise, this trend is likely to continue.

**Table 3.13** Average earning difference between wage-earners and self-employed workers by gender (yuan/hour), 2000 and 2008

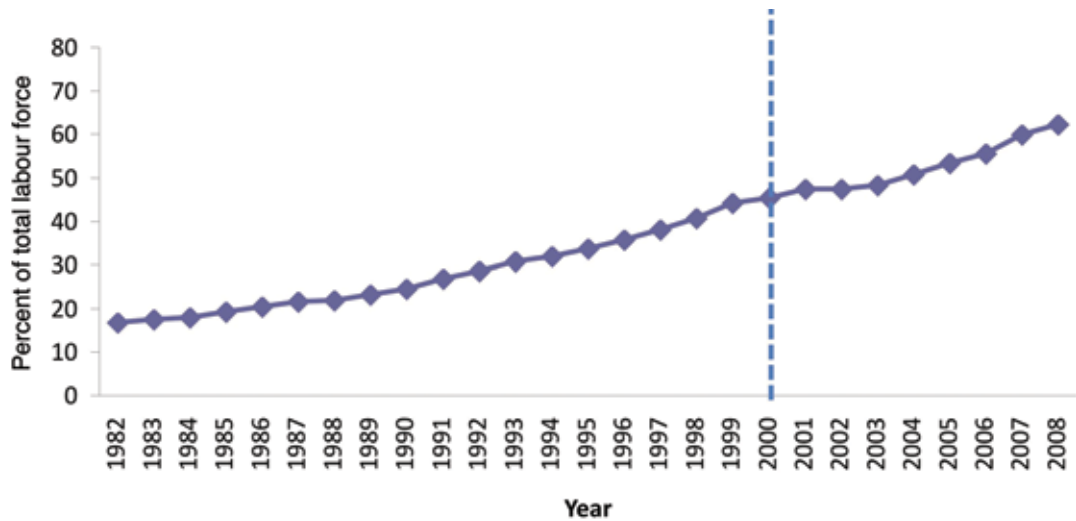
	2000			2008			2000–2008 Growth rate (%)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Wage-earning	3.0 (2.5)*	3.2 (2.7)	2.5 (1.7)	5.4 (7.3)	5.9 (8.4)	4.2 (3.6)	7.7	7.9	6.7
Self-employment	7.2 (44.3)	9.1 (52.4)	2.7 (3.9)	7.4 (21.4)	7.9 (23.9)	6.6 (16.3)	0.35	-1.75	11.8

Note: Data sampling is presented in the notes to Table 3.1.\*Standard deviation in parentheses.  
Source: Wang *et al.* (2012).

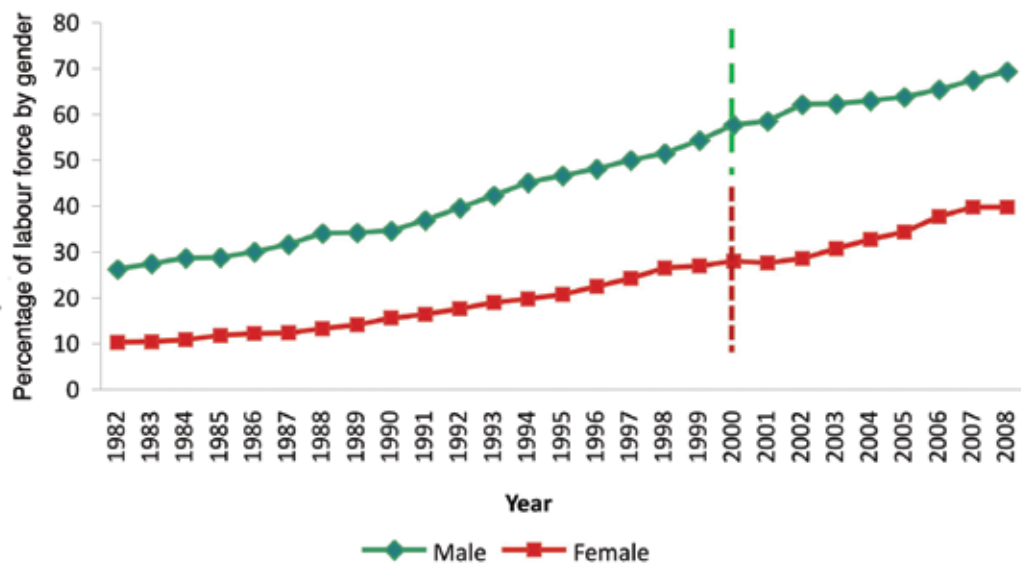
9. As described in Huang *et al.* (2010), since our wage figure was measured at the end of 2008 this figure of 7.7 per cent annual growth of the unskilled wage could be on the low side. The reason for this is that the financial crisis hit in September 2008 and by December of 2008 (when the wage rate was measured), the real wage had already fallen (or at least was stagnant) from that of the year before. Therefore, if, being conservative, we say that the wage-rate growth between 2007 and 2008 was stagnant, the annual growth of the unskilled wage between 2000 and 2007 was nearly 9 per cent, about the same rate of growth as of GDP per capita.

Figure 3.5 Trends in off-farm employment, 1982–2008

a. The trend of total off-farm employment, 1982–2008



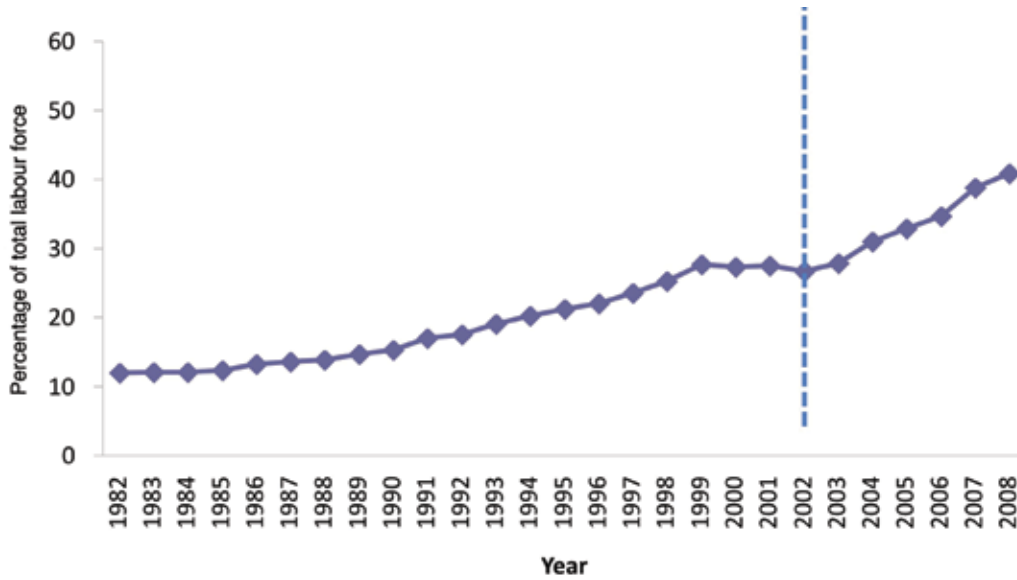
b. The trend of off-farm employment by gender, 1982–2008



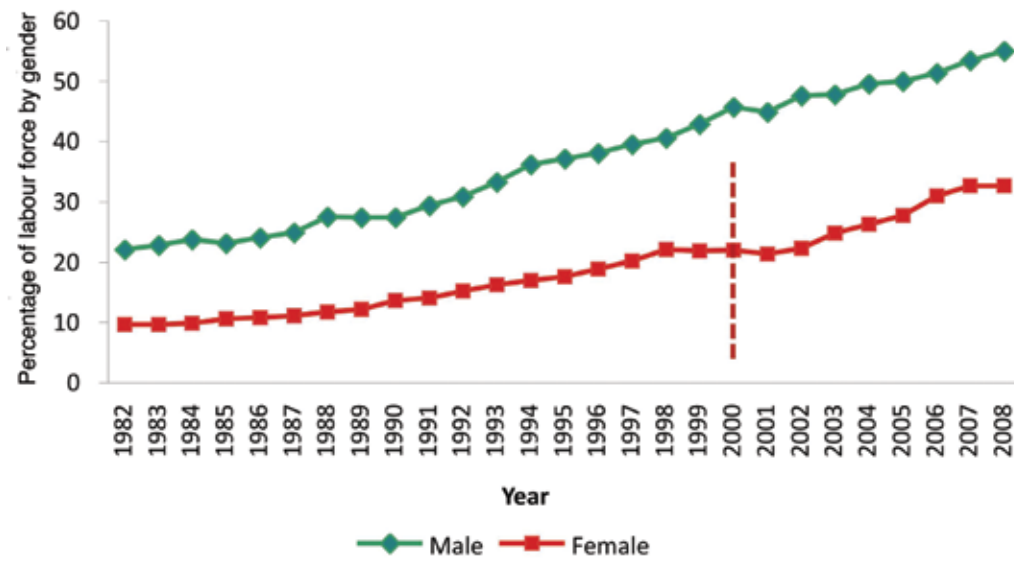
Note: Data sampling is presented in the note to Table 3.1.  
Source: Wang *et al.* (2011b).

Figure 3.6 Trends in wage-earning employment, 1982–2008

a. The trend of total wage earning, 1982–2008



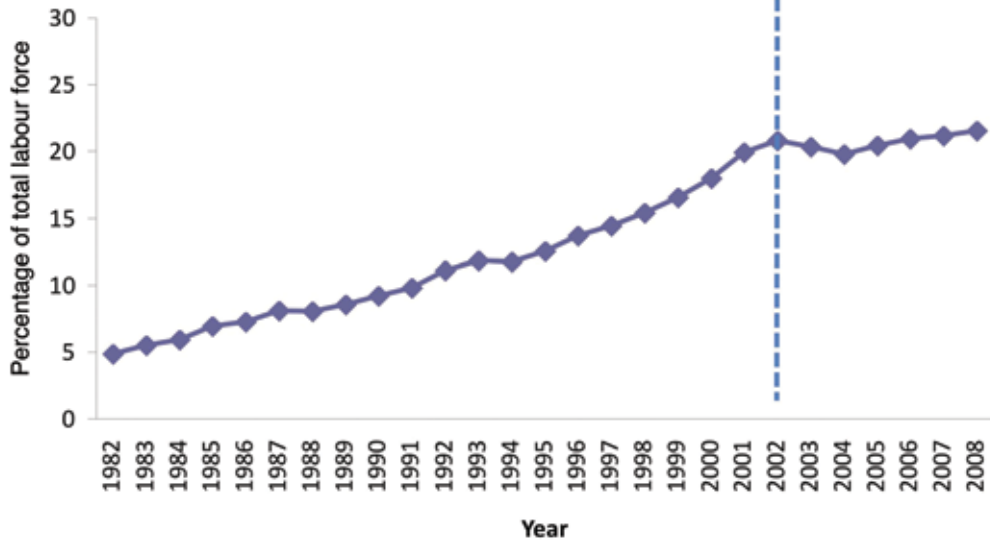
b. The trend of wage earning by gender, 1982–2008



Note: Data sampling is presented in the note to Table 3.1.  
Source: Wang *et al.* (2011b).

Figure 3.7 Trends in self-employment, 1982–2008

a. Total self-employment, 1982–2008



b. Self-employment by gender, 1982–2008



Note: Data sampling is presented in the note to Table 3.1.  
Source: Wang *et al.* (2011b).

## Producer perspectives on farming

China's modernisation success is driven by the remarkable progress in its agricultural sector, even given the challenges. Small farms have experienced new inputs and adopted new technologies such as mechanical operation, with more functioning of factor markets and the emergence of cooperative and custom services. However, with the aim of becoming a modern nation with an innovation-based and sustainable agricultural economy, it is important to improve understanding of the nature and perspectives of labourers, especially the younger generation.

To do so, we rely on the same samples used when evaluating the attitudes of farmers to FPCs in Section 3.3. Here, we designed six additional questions to capture current employment status and perspectives on the next five years and in the long run. With the hypothesis that employment decisions are jointly determined between husband and wife, we also ask about the employment status of the respondent's partner. Descriptive statistics tabulated by labourers at two age cohorts, employment and perspective are presented in Table 4.1.

Our results indicate that labour employment profiles created by different age cohorts highlight employment trends consistent with the results in Section 3.5. They also demonstrate one of the most striking characteristics of agricultural production: on-farm employment is and will be dominated by 'old' labour (average age 47.5 years). In 2011, small farms were mainly managed by household heads, and around two-thirds of household heads and 5.7 per cent of young labourers are full-time farmers. Young rural people (16–24 years old) participated in full-time off-farm employment more than five times as often (48.8 per cent) as heads of households (8.6 per cent). Combined with part-time workers employed off the farm, the proportion of young people is still more than 20 per cent higher than that of household heads in the off-farm employment sector. When disaggregating the employment by gender, we find that 84 per cent of female older labourers are working full-time more than 20 per cent more than male counterparts working full-time on the farm.

From the perspective of employment on the farm, the current trends will continue in the next five years. Overall, the proportion of older labourers willing to work full-time on the farm is expected to reduce by around 2 per cent per year in the next five years. This is the same as that of young labour. However, it is expected that more young labourers would work full-time off the farm, if this proportion increases by around 10 per cent from 48.8 currently to 58.2 five years later, if more opportunities for off-farm employment are available. Looking at gender, we found that the proportion of female old labourers who prefer to work on the farm remains 13 per cent higher than that of male counterparts. However, the proportion of female workers will reduce by 10 per cent in the next five years, from 84.1 per cent to 73.8 per cent.

When extending the employment perspective further into the future, employment trends on the farm are completely different between the two age cohorts. Among the labourers who plan to work full- or part-time on the farm in the next five years are only around 15 per cent of those now aged 16–24, but 87 per cent of the older group. Taking into account the demographic transformation, we conclude that the trends of both aging and feminisation in agriculture will continue in the future.

Our results also indicate that, on average, education levels of those working off the farm are higher than those of labourers working on the farm. The average length of education for all labourers working on and off the farm is 7 and 9 years, respectively. For the household heads, average education level of those who work as full-time farmers (7 years) is 1.2 years less than of those working off the farm (8.2 years). For the young workers, there is no statistical difference in education level (9 years) between those who work on or off the farm, because in 1986 China started to implement compulsory education of 9 years.

The existing literature indicates that the joint decision of employment between husband and the wife is statistically significant (Huffman and Lange, 1989). This leads us to make the following assumption: if young workers are more likely to marry a person with rural *hukou*,<sup>10</sup> the probability of their employment

10. *Hukou* is a name used in mainland China for the household registration system



on the farm will increase, and vice versa. Given that more than 86 per cent of the 455 young workers surveyed were not married, we focus only on the perspective of their marriage within this group. To our surprise, only just over a quarter of them expected to marry a partner with rural *hukou*. There is also significant gender difference. The proportion of women who may marry rural labourers (17.7 per cent) is only half of that of male young workers (35 per cent). This is consistent with our conclusion that Chinese agricultural production will still present the characteristics of aging in the long run.

Given the employment perspective of youth, and increased opportunity cost of rural labourers, the promise of sustainable growth in agriculture could be fulfilled by the growth of total factor productivity (TFP), given the exhausted increase of other inputs like land. This also implies that the portfolio of technology expansion should be targeted to older labourers, with special attention to the female older labourers. Furthermore, China should also promote specialisation in farming, which could be managed by the educated younger labourers, with the improvement of land and credit markets.

**Table 4.1** Employment status and perspective of rural labourers, 2010

	The youth			Head of household		
	M+F	Male	Female	M+F	Male	Female
<b>Share (%) of employment in</b>						
-full-time farming	5.7	5.8	5.6	65.9	60.3	84.1
-part-time farming	8.4	10.1	5.6	24.2	28.2	11.2
-full-time off-farming	48.8	50.9	45.5	8.6	9.8	4.7
-others	37.1	33.2	43.6	1.3	1.7	0.0
<b>Share (%) of employment expected in the next five years in</b>						
-full-time farming	3.3	3.6	2.8	63.5	60.3	73.8
-part-time farming	7.0	9.0	3.9	22.0	24.7	13.1
-full-time off-farming	58.2	58.8	57.3	10.1	10.9	7.5
-others	31.5	28.6	36.0	4.5	4.1	5.6
Share (%) of employment expected to stay in full-time farming in the long term under current conditions	13.1	14.6	10.5	87.3	85.2	93.9
For those do not marry, the share (%) of them who would like to marry a person with rural <i>hukou</i>	28.2	35.0	17.7	37.5	42.9	0.0
No. of observations	455	348	107	455	277	178

Note: Data sampling is described presented in the note to Table 3.5.  
Source: Authors' own survey.

## Concluding remarks

This paper starts by describing the rapid growth and significant structural changes of the Chinese economy in general and agriculture in particular. The agricultural sector performed remarkably well during the reform era. The improved incentives and property rights that were part of the decollectivisation movement led to dramatic increases in productivity. Gradually improving domestic markets and liberalising agricultural trade have induced a fundamental shift in the orientation of many producers towards higher levels of commercialisation and increased specialisation into many labour-intensive, high-value-added crops in which China clearly has a comparative advantage. Agricultural development has played an important role in, and has become integral to, the process of national modernisation and globalisation.

Hundreds of millions of small-scale farmers have benefited from the successes of China's agricultural development. To raise their income in agriculture, farmers have diversified their agricultural production by gradually shifting from grain-based agriculture to high-value crops and livestock. Regional production has also been moving towards sectors of higher comparative advantage.

Despite significant responses by small-scale farmers during China's modernisation and globalisation, China's small farm size is still a major challenge facing policymakers and farmers. This paper discusses several major efforts that allow China's small farms to increase their ability to generate higher incomes.

One such major effort is in the area of land policy. While reform through the Household Responsibility System has been critical in raising agricultural productivity by individual households, farm size has been falling. To reverse this trend, land-use rights and land-rental markets have been enhanced. This paper shows that small-scale farmers have benefited from recent rapid growth of the rental market. Rising off-farm employment in general and migration in particular have also facilitated land rental and helped those who decided to stay in farming to expand their farm size.

Small farmers have survived rapid market transformation in China, although food safety remains a major concern in this agricultural economy dominated by small farms. The literature review

shows that, while the downstream segment of the marketing chain has undertaken significant transformation, farmers have been able to adapt to this change due to rapid development of wholesale markets and competitive markets at the farm gate. Small, poor farmers have been participating in the transformation. Of course, when a food market is dominated by small traders, meeting the growing demand for improved food safety in both Chinese and foreign markets is challenging.

To assist small farms in increasing their production and marketing and bargaining ability, China has been promoting the development of farmer professional cooperatives (FPCs). Although FPCs are still in the early stage of development, farmers are benefiting and receiving services from FPCs in production and marketing. However, our survey also shows that young people have more negative attitudes than older people towards FPCs. Given the trend of feminisation and aging in Chinese agriculture, FPCs may need to focus more specifically on female and older smallholders.

The pattern of mechanisation in China's agriculture is an innovation by small-scale Chinese farmers. Given rising rural wages and largely part-time farming, saving agricultural labour inputs for other economic earning activities is essential for small-scale farmers to increase their income. Mechanical operation through custom services has been widely adopted in the production of grain, particularly wheat and rice.

Probably the most important method of raising the income of small-scale farmers is off-farm employment. Our recent survey shows that there were about 310 million members of the rural labour force fully or partially employed off the farm in 2008 – this is critical in raising farmers' income. Young people and male workers have more opportunities to obtain off-farm jobs than do older and female workers. With rising wages, wage-earning and migration have surpassed self-employment and become the primary choice of rural labourers when they look for work in off-farm sectors.

The last section of this paper examines the perspectives of young people on farming, which raises concern about the future supply of agricultural labour, and aging as well as feminisation of China's

agriculture in future. How to interest young people in agriculture is an important policy issue that may help China to modernise its agriculture in the long run. In this context, the land-rental market and any policy that could facilitate expansion of the rental market, as well as policies to encourage young

people to participate in and lead FPCs, should be explored. Policies to promote mechanisation, which may further increase youth interest in agriculture, should be considered. On the other hand, China also requires better agricultural extension services to provide for older and female farmers in the future.

# References

- BBC. (2008). China to punish baby milk makers. September 12, <http://news.bbc.co.uk/2/hi/asia-pacific/7611732.stm>.
- Brandt, L., J. Huang, G. Li and S. Rozelle (2002) Land rights in rural China: Facts, fictions and issues. *The China Journal* 47: 67–97.
- Brandt, L., T. Rawski and J. Sutton (2008) Industrial development in China. In: Brandt, Loren and Thomas G. Rawski, eds. *China's Great Economic Transformation*. Cambridge University Press, New York: 569–632.
- Bruggemanna, R., Lutkepohl, H. and Saikkonen, P (2006) Residual autocorrelation testing for vector error correction models. *Journal of Econometrics* 134: 579–604.
- Cai, F., D. Wang and Y. Du (2002) Regional disparity and economic growth in China: The impact of labor market distortions. *China Economic Review* 13(2–3): 197–212.
- Cai, F., A. Park and Y. Zhao (2008) The Chinese labor market in the reform era. In: Brandt, L. and T. Rawski, eds. *China's Economic Transition: Origins, mechanisms, and consequences*. Cambridge University Press: 167–214.
- Cai, F. and M. Wang (2010) Growth and structural changes in employment in transition China. *Journal of Comparative Economics* 38 (1): 71–81.
- Carter, R. M., and Y. Yao (2002) Local versus global separability in agricultural household models: The factor price equalization effect of land transfer rights. *American Journal of Agricultural Economics* 84: 702–715.
- Chen, X.W. (2008) China will stop the grain export. *The Beijing News*, accessed September 2008. <http://www.farmer.gov.cn/ReadNews.asp?NewsID=621>
- Chen, T. (2010) Revitalization measures and the development of China's dairy industry. *Food and Nutrition in China* (5) (in Chinese).
- Chen, Z., W. Huffman, S. Rozelle (2011) Inverse relationship between productivity and farm size. *Contemporary Economic Policy* 29(4): 580–592.
- Cho, S. H., Z. Chen, S.T. Yen (2007) Spatial variation of output–input elasticities: Evidence from Chinese county-level agricultural production data. *Papers in Regional Science* 86: 139–157.
- deBrauw, A. (2011) Migration and child development during the food price crisis in El Salvador. *Food Policy* 36(1): 28–40.
- deBrauw, A. and S. Rozelle (2008) Migration and household investment in rural China. *China Economic Review* 19(2): 320–335.
- deBrauw, A., Q. Li, C. Liu, S. Rozelle, L. Zhang (2008) Feminization of agriculture in China? Debunking myths surrounding women's participation in farming. *China Quarterly* 194: 327–348.
- Deng, X., J. Huang, S. Rozelle, and E. Uchida (2006) Cultivated land conversion and potential agricultural productivity in China. *Land Use Policy* 23(4): 372–384.
- Deng, H., J. Huang, Z. Xu, S. Rozelle (2010) Policy support and emerging farmer professional cooperatives in rural China. *China Economic Review* 21: 495–507.
- Dries, L. and J.F.M. Swinnen (2004) Foreign direct investment, vertical integration, and local suppliers: Evidence from the Polish dairy sector. *World Development* 32(9): 1525–1544.
- FAO (2011a) <http://www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/>
- FAO (2011b) *The State of Food Insecurity in the World: How does International Price Volatility affect Domestic Economies and Food Security?* FAO, Rome.

- Fleisher, B.M. and Y. Liu (1992) Economies of scale, plot size, human capital, and productivity in Chinese agriculture. *Quarterly Review of Economics and Finance* 32: 112–123.
- Fleisher, B.M. and X. Wang (2005) Returns to schooling in China under planning and reform. *Journal of Comparative Economics* 33(2): 265–277.
- Fulton, M (1995) The future of Canadian agricultural cooperatives: A property rights approach. *American Journal of Agricultural Economics* 77(5): 1144–1152.
- Gao, L., Huang, J. and Rozelle, S. 2012. Cultivated Land Rental Market and Investment in China. *Agricultural Economics* 43(4).
- Giles, J. (2006) Is life more risky in the open? Household risk-coping and the opening of China's labor markets. *Journal of Development Economics* 81(1): 25–60.
- Glauben, T., H. Thomas and X. Wang (2008) Labor market participation of Chinese agricultural households: Empirical evidence from Zhejiang province. *Food Policy* 33(4): 329–340.
- Gorton, M., M. Dumitrashko and J. White (2006) Overcoming supply chain failure in the agri-food sector: A case study from Moldova. *Food Policy* 31: 90–103.
- Hayami, Y. and V.W. Ruttan (1985) *Agricultural Development: An international perspective*. Johns Hopkins University Press, Baltimore.
- Hebei Provincial People's Press 2009. *Baoding Municipal People's Press 2009. 009. a. on Policy Enforcement of the Planning for Yangzhi Xiaoku (Cow Hotel) and Milk Collection Stations*. <http://www.hbrd.net/InfoPage.aspx?nid=5779> (in Chinese)
- Hertel, T.W. (1997) *Global Trade Analysis. Modelling and applications*. Cambridge University Press, New York.
- Hu, D., T. Reardon, S. Rozelle, P. Timmer and H. Wang (2004) The emergence of supermarkets with Chinese characteristics: Challenges and opportunities for China's agricultural development. *Development Policy Review* 22: 5557–5586.
- Huang, J. and C. Chen (1999) *Effects of Trade Liberalization on Agriculture in China: Commodity and Local Agricultural studies*. United Nations, ESCAP CGPRT Centre, Bogor, Indonesia.
- Huang, J. and S. Rozelle (1995) Environmental stress and grain yields in China. *American Journal of Agricultural Economics* 77: 853–864.
- Huang, J. and S. Rozelle (1996) Technological change: Rediscovering the engine of productivity growth in China's agricultural economy. *Journal of Development Economics* 49: 337–369.
- Huang, J. and S. Rozelle (June 2003) Trade reform, WTO and China's food economy in the 21st century. *Pacific Economic Review* 8(2): 143–156.
- Huang, J. and S. Rozelle (2006) The emergence of agricultural commodity markets in China. *China Economic Review* 17: 266–280.
- Huang, J., C. Pray, S. Rozelle and Q. Wang (2002) Plant biotechnology in China. *Science* 295: 674–677.
- Huang, J., F. van Tongeren, F. Dewbre and H van Meijl (2004) A new representation of agricultural production technology in GTAP. Paper presented at the *Seventh Annual Conference on Global Economic Analysis*, Washington DC.
- Huang, J., H. Qiu and R. Scott (2008a) More pain ahead for China's food prices. *Far Eastern Economic Review* 171(5).
- Huang, J., Y. Wu, H. Zhi and S. Rozelle (2008b) Small holder incomes, food safety and producing and marketing China's fruit. *Review of Agricultural Economics* 30(3): 469–479.
- Huang, J., Y. Wu, Z. Yang, S. Rozelle, J. Fabiosa and F. Dong (2010) Farmer participation, processing, and the rise of dairy production in Greater Beijing, P.R. China. *Canadian Journal of Agricultural Economics* 58(3): 321–342.

- Huang, J., X. Wang, H. Zhi, Z. Huang and S. Rozelle (2011a) Subsidies and distortions in China's agriculture: Evidence from producer-level data. *The Australian Journal of Agricultural and Resource Economics* 55: 53–71.
- Huang, J., H. Zhi, Z. Huang, S. Rozelle and J. Giles (2011b) The impact of the global financial crisis on off-farm employment and earning in rural China. *World Development* 39(5): 797–807.
- Huang, J., J. Yang and S. Rozelle (2012a). *The Political Economy of Food Price Policy in China*. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Huang, J., X. Ji and S. Rozelle (2012b) Agricultural Subsidy and its Impact on Land Rental Markets in China. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Huang, J., L. Gao and S. Rozelle (2012c) The effect of off-farm employment on household's decisions to rent out and rent in cultivated land in China. *China Agricultural Economic Review* 4(1), 5-17.
- Huffman, W.E., (1991) Agricultural households model: Survey and critique. In: Hallberg, M.C., J.L. Findeis and D.A. Lass, eds. *Multiple Job Holding Among Farm Families*. Iowa State University Press, Ames.
- Huffman, W.E. and M.D. Lange (1989) Off-farm work decisions of husbands and wives: Joint decision-making. *Review of Economics and Statistics* 71: 471–480.
- IFPRI (International Food Policy Research Institute) (2010) Headey, D. and S. Fan. *Reflections on the Global Food Crisis: How Did it Happen? How has it Hurt? And How can we Prevent the Next One?* IFPRI Research Monograph 165. Washington, DC.
- IMF (October 2008) *World Economic Outlook Databases*.  
<http://www.imf.org/external/pubs/ft/weo/2008/02/weodata/index.aspx>
- Ivanic, M. and W. Martin (2008) Implications of higher global food prices for poverty in low-income countries. *Agricultural Economics* 39: 405–416.
- Ji, J., X. Yu and F. Zhong (2012) Machinery investment decision and off-farm employment in rural China, *China Economic Review* 23: 71–80.
- Jia, X., J. Huang, H. Luan, S. Rozelle and J. Swinnen (2011) China's Milk Scandal, Government Policy and Production Decisions of Dairy Farmers: The case of Greater Beijing. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Kung, K.J. (2002) Off-farm labor markets and the emergence of land rental markets in rural China. *Journal of Comparative Economics* 30: 395–414.
- Kuznets, Simon (1941) National Income, 1919-1938, National Bureau of Economic Research, Inc.
- Lau, S.P. (2008) Using an error-correction model to test whether endogenous long-run growth exists. *Journal of Economic Dynamics & Control* 32: 648–676.
- Lele, U. (1981) Co-operatives and the poor: A comparative perspective. *World Development* 9(1): 55–72.
- Lin, J. (1990) Collectivization and China's agricultural crisis in 1959–1961. *Journal of Political Economy* 98(6): 1228–1252.
- Lin, J. (1992) Rural reforms and agricultural growth in China. *American Economic Review* 82: 34–51.
- Liu, C., ed. (2003–2010) *China Dairy Yearbook*. China Agricultural Publisher, Beijing.
- Liu, Y. and X. Wang (2005) Technological progress and Chinese agricultural growth in the 1990s. *China Economic Review* 16: 419–440.
- Liu, S., M.R. Carter and Y. Yao (1998) Dimensions and diversity of property rights in rural China: Dilemmas on the road to further reform. *World Development* 26(10): 1789–1806.
- Lu, J., and Z. Tao (11 June 2009) Sanlu's melamine-tainted milk crisis in China. *Harvard Business Review*.

- Luan, Hao, Xiangping Jia, Jikun Huang, Shengli Li, Scott Rozelle and Johann Swinnen (2011) *Marketing Transformation at Upstream Dairy Chain after Milk Scandal in China: Evidence from Greater Beijing*. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Luo, R., L. Zhang, J. Huang and S. Rozelle (2007) Elections, fiscal reform and public goods provision in rural China. *Journal of Comparative Economics* 35: 583–611.
- Mandal, S.K. and Madheswaran, S. (2010) Causality between energy consumption and output growth in the Indian cement industry: An application of the panel vector error correction model (VECM). *Energy Policy* 38: 6560–6565.
- Mo, D., J. Huang, X. Jia, H. Luan, J. Swinnen and S. Rozelle (2012 forthcoming). Checking into China's Cow Hotels: Have post-milk scandal policies changed the structure of the dairy sector? *Journal of Dairy Science*. MOA (2011) <http://english.agri.gov.cn/ga/amo/mandates/>
- NSBC (National Bureau of Statistics of China) (2011a) *China's Statistical Yearbook, 1985–2011*. China Statistical Press, Beijing.
- NSBC (National Bureau of Statistics of China) (2011b) *China Rural Statistical Yearbook, 1985–2011*. China Statistical Press, Beijing.
- NSBC (National Bureau of Statistics of China) (2000–2011) *International Statistical Yearbook*. Various years from 2000 to 2011, China Statistical Press, Beijing.
- NSBC (National Bureau of Statistics of China) (2005–2008) *China Monthly Economic Indicators*. Various issues from 2005 to 2008, Office of China Monthly Economic Indicator, Beijing
- Nyberg, A. and S. Rozelle (1999) *Accelerating China's Rural Transformation*. The World Bank, Washington DC.
- Park, A., H. Jin, S. Rozelle and J. Huang (February 2002) Market emergence and transition: Arbitrage, transition costs, and autarky in China's grain market. *American Journal of Agricultural Economics* 84(1): 67–82.
- Riskin, C., R. Zhao and S. Li (2001) *China's retreat from equality: Income distribution and economic transition*. M.E. Sharpe, New York.
- Robles, M. and M. Torero (2010) Understanding the impact of high food prices in Latin America. *Economia* 10(2): 117–164.
- Rosen, D., J. Huang and S. Rozelle (June 2004) Roots of competitiveness: China's evolving agriculture interests. *Policy Analysis in International Economics* 72. Institute for International Economics, Washington DC.
- Rozelle, S., G. Li, M. Shen, A. Hughart and J. Giles (June 1999) Leaving China's farms: Survey results of new paths and remaining hurdles to rural migration. *China Quarterly* 158: 367–393.
- Rozelle, S., Dong, X. Y., Zhang, L. X., & Mason, A. (2002). Gender wage gaps in post-reform rural China. *Pacific Economic Review* 7(1), 157–179.
- Rozelle, S., J. Huang and D. Sumner (2006) *China's Horticulture Economy: Supply, demand and trade*. Report for the Western Growers American Soybean Association, Beijing, China.
- Shen, M., L. Zhang, J. Huang and S. Rozelle (2005) *Farmers' Professional Associations in Rural China: State dominated or new state-society partnerships?* Working Paper. Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences, Beijing, China.
- Staatz, J.M. (1987) Recent developments in the theory of agricultural cooperation. *Journal of Agricultural Cooperatives* 2: 74–95.
- Swinnen, J. (2005) *When the Market Comes to You – Or Not. The Dynamics of Vertical Coordination in Agri-Food Chains in Transition, Final report on Dynamics of Vertical Coordination in ECA Agri-Food Chains: Implications for Policy and Bank Operations*. The World Bank.

- Swinnen, J.F.M. (2009) Reforms, globalization, and endogenous agricultural structures. *Agricultural Economics* 40: 719–732.
- Taylor, J.E., S. Rozelle and A. de Brauw (2003) Migration and income in source communities: A new economics of migration perspective from China. *Economic Development and Cultural Change* 52, 75–101.
- Turgis, Claire (2008) *Food Security in China*. Working Paper. United Nations World Food Programme, Beijing.
- Wang, J., J. Huang, S. Rozelle, Q. Huang and A. Blanke (2007) Agriculture and groundwater development in Northern China: Trends, institutional responses, and policy options. *Water Policy* 9(S1): 61–74.
- Wang, D., Z. Zhang, J. Cheng and H. Hou (2009a) The impact of the international financial crisis on transfer of rural labour force in China's impoverished areas. *Chinese Rural Economy* 9: 21–27.
- Wang, H., X. Dong, S. Rozelle, J. Huang and T. Reardon (2009b) Producing and procuring horticultural crops with Chinese characteristics: The case of Northern China. *World Development* 37(11): 1791–1801.
- Wang, X., J. Huang, L. Zhang and S. Rozelle (2011a) The rise of migration and the fall of self employment in rural China's labor market. *China Economic Review* 22: 573–584.
- Wang, X., J. Huang, L. Zhang and S. Rozelle (2011b) The Trends of Migration and Self-employment: Gender and Age Effects. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Wang, X., J. Huang, L. Zhang and S. Rozelle (2012) Mechanization service and agricultural productivity: Evidence from Smallholders in Jiangsu province. Working Paper. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Wen, J.B. (2008) *Government Report of People's Republic of China*, accessed August 2008. [http://news.xinhuanet.com/misc/2008-03/18/content\\_7813043.htm](http://news.xinhuanet.com/misc/2008-03/18/content_7813043.htm)
- Woodruff, C. (2006). Self-employment: Engine of growth or self-help safety net? Presented on the World Bank Conference "Rethinking the Role of Jobs for Shared Growth". Washington DC, US: World Bank.
- World Bank (2002) *World Development Indicators 2002*. Washington, DC.
- World Bank (2008) *Double jeopardy: Responding to high food and fuel prices*, accessed August 2008. <http://www.worldbank.org/html/extdr/foodprices>.
- Wuger, M. and Thury, G (2001) The treatment of seasonality in error correction models as unobserved component: A case study for an Austrian consumption function. *Empirical Economics* 26: 325–341.
- Xinhua News (2008) China Focus: Chinese premier calls on sick infants. [http://news.xinhuanet.com/english/2008-09/21/content\\_10088285.htm](http://news.xinhuanet.com/english/2008-09/21/content_10088285.htm), Sept. 21.
- Yang, J., H. Qiu, J. Huang and S. Rozelle (2008) Fighting global food price rises in the developing world: The response of China and its effect on domestic and world markets. *Agricultural Economics* 39 (supplement): 453–464.
- Yao, Y. (2000) The development of the land lease market in Rural China. *Land Economics* 76(2): 252–266.
- You, L (forthcoming). A tale of two countries: Spatial and temporal patterns of rice productivity in China and Brazil. *China Economic Review*.
- Zhang, L., Q. Li and S. Rozelle (2005) Fertilizer demand in China: What is causing farmers to use so much fertilizer? Working Paper. Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences, Beijing, China.
- Zhang, J., L. Zhang, S. Rozelle and S. Boucher (2006) Self-employment with Chinese characteristics: The forgotten engine of rural China's growth. *Contemporary Economic Policy* 24(3): 446–458.



Zhang, Y., X. Wang, T. Glauben, B. Bruemmer (2011) The impact of land reallocation on technical efficiency: Evidence from China. *Agricultural Economics* 42(4): 495–507.

Zhao, Y. (1999) Leaving the countryside: Rural to urban migration decisions in China. *American Economic Review* 89: 281–286.

Zhou, Z.-Y., W. Tian and J. Zhou (2002) The emerging dairy economy in China: Production, consumption and trade prospects. *Australasian Agribusiness Review* 10 (Paper 8).

# Knowledge Programme

## Small Producer Agency in the Globalised Market

The Knowledge Programme Small Producer Agency in the Globalised Market aims to map, elicit and integrate knowledge on the dilemmas confronting small-scale producers in global, regional and national markets. The programme works with different actors to bring new voices, concepts and insights into the global debate. It thereby seeks to support the development community, including policy makers, producer organisations and businesses in their search for better informed policies and practices. The programme is led by the Humanist Institute for Development Cooperation (Hivos) and the International Institute for Environment and Development (IIED), and integrates a global learning network, convened by Mainumby Ñacurutú in Bolivia.

## Small-scale farmers in China in the face of modernisation and globalisation

China's economy has been the fastest growing in the world since 1980. Its agricultural sector too has grown and has undergone dramatic changes with rapid modernisation and globalisation. This paper, the third in a series from the Knowledge Programme Small Producer Agency in the Globalised Market, aims to provide insights into small-scale farming in China in the face of these phenomena. Based on current literature and a survey of youth perceptions of farming, the paper examines the way modernisation and globalisation in Chinese agriculture and the wider national economy are being addressed at the farm level. It assesses how well public policies and institutional arrangements are enabling small-scale farmers to enter and operate in markets, and whether small-scale farmers influence market-related policies. It discusses who is migrating, and who is staying on the farm, and what opportunities exist for collective action to improve market access. It also looks at the role of youth in farming and what the future holds for them.

**Hivos**  
people unlimited

Hivos  
Raamweg 16  
PO Box 85565  
NL- 2508 CG  
The Hague  
The Netherlands  
info@hivos.net  
www.hivos.net



MAINUMBY  
ÑAKURUTÚ

Mainumby Ñacurutú  
Victor Sanjinez No. 2628  
Edificio Madrid  
Piso 6, of. 6B  
La Paz  
Bolivia  
ogied759@gmail.com  
www.mainumby.org.bo/

**iied**

International Institute for  
Environment and Development  
(IIED)  
80-86 Gray's Inn Road  
London WC1X 8NH  
United Kingdom  
info@iied.org  
www.iied.org