
8 China's Agricultural Development:

Achievements and Challenges

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Introduction

The development of the agricultural sector plays an important role in the Chinese economic transformation during the reform period (1978–2012). First, the rural reform centring on the household production responsibility system has increased agricultural output and productivity, lifting millions of people out of absolute poverty since the late 1970s. Second, increased productivity in the agricultural sector, coupled with institutional reform allowing the mobility of rural labour force, has led to unprecedented and large-scale rural–urban migration, permitting China to enjoy the effects of a tremendous ‘resource shift’ to enhance its economic growth.¹ Third, in the past 30 years, the seemingly unlimited supplies of labour flowing from the rural to the urban sector have contributed positively to China’s industrialisation process. Finally, development of the agricultural sector, in terms of rising outputs and productivity, helps China to confront the food security challenges arising from meeting the food demand of one-fifth of the world population using only seven per cent of the world’s arable land.

The agricultural sector, however, faces some important challenges with respect to reform and management of the land system, economy of scale in agricultural production, technological development in agriculture, fertility of farmland, the rural social protection system, and rural community management. These challenges indicate that further development of the agricultural sector is crucial for China in implementing the new growth strategy. This chapter reviews the major achievements in China’s agricultural development to date, and discusses the key challenges now facing the sector. The chapter points out how China can confront these challenges by deepening the agricultural reform, including reform of the land system; enhancing technological progress in agricultural production; providing the necessary social support and protection for farmers as part of the government’s effort to address China’s rural and

¹ The effect of the ‘resource shift’ is defined as the efficiency gains resulting from moving resources (labour) from low (rural) to high (urban) productivity areas of the economy.

urban income inequality; and, changing the consumption patterns of certain agricultural products in order to improve people's health and reduce the waste of agricultural resources.

Achievements in Agricultural Development

Steady Growth of Agricultural Outputs Resulting from Reform and Policy Change

Agricultural production over the period from 1978 to 2012 demonstrated a pattern of stable growth, much due to the impact of economic reform in rural areas and changes in government policies towards agricultural production and farmers' wellbeing. For example, from 1978 to 2012, China's grain production nearly doubled and its milk production increased by 41.1 times. More recently, from 2000 to 2012, milk production increased 3.5 times, while vegetable oil production increased by 17.64 per cent. The difference in the growth rates during the two periods has obviously narrowed, but the outputs of all the major agricultural products continue to increase (Table 8.1 and Figure 8.1).

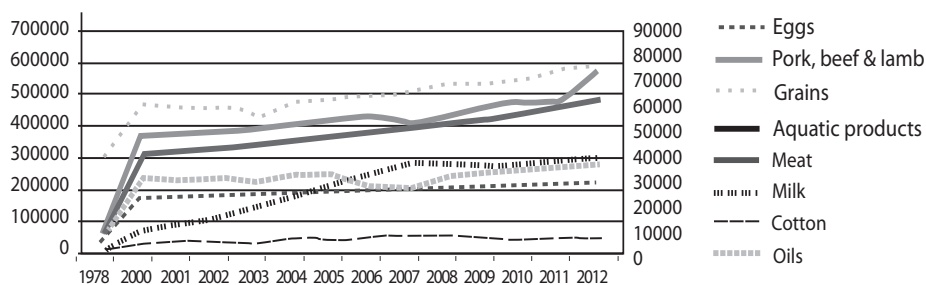
An important criterion that can be used to measure progress in agricultural development is output per capita, which is increasing. Grain output per capita was 435.4 kilograms (kg) in 2012, substantially higher than the 116.4 kg and 69.3 kg observed in 1978 and 2000, respectively. Pork, beef and lamb per capita production in 2012 was also higher than the 45.5 kg and 17.0 kg observed in 1978 and 2000. The aquatic products per capita in 2012 were higher than the 38.7 kg and 14.2 kg observed in 1978 and 2000. The milk per capita in 2012 is higher than the levels of 27.7 kg and 21.1 kg observed in 1978 and 2000. The oils per capita in 2012 are higher than the observed levels of 20.2 kg and 2.3 kg in 1978 and 2000. The cotton per capita in 2012 is higher than the levels of 2.8 kg and 1.6 kg in 1978 and 2000 (Table 8.2).

Table 8.1 Outputs and growth rates of major agricultural products since 1978 (1,000 ton)

Year	Grains	Cotton	Oils	Meat	Pork, beef & lamb	Milk	Eggs	Aquatic products
1978	304,770.0	2167.0	5,218.0	19,265.0	8,653.0	883.0	5,347.0	4,654.0
2000	462,175.2	4,417.3	29,548.3	60,139.0	47,432.3	8,274.3	21,820.1	37,062.3
2001	452,636.7	5,323.5	28,649.0	61,058.4	48,321.1	10,254.6	22,101.0	37,959.3
2002	457,057.5	4916.2	28,972.1	62,342.9	49,284.3	12,997.8	22,657.0	39,548.6
2003	430,695.3	4859.7	28,110.0	64,433.2	50,897.8	17,462.8	23,330.7	40,770.2
2004	469,469.5	6,323.5	30,659.1	66,087.2	52,343.1	22,606.1	23,706.4	42,465.7
2005	484,021.9	5,714.2	30,771.4	69,388.7	54,734.9	27,533.7	24,381.2	44,198.6
2006	498,042.3	7,532.8	26,403.1	70,890.4	55,909.6	31,934.1	24,240.0	45,836.0
2007	501,602.8	7,623.6	25,687.4	68,657.2	52,838.5	35,252.4	25,289.8	47,475.2
2008	528,709.2	7,491.9	29,528.2	72,787.4	56,140.0	35,558.2	27,022.0	48,956.1
2009	530,820.8	6,376.8	31,542.9	76,497.5	59,157.2	35,188.4	27,424.7	51,164.0
2010	546,477.1	5,961.1	32,301.3	79,258.3	61,231.5	35,756.2	27,627.4	53,730.0
2011	571,208.5	6,589.0	33,067.6	79,578.4	60,937.3	36,578.5	28,114.2	56,032.1
2012	58,9570.0	6,849.0	34,760.0	83,840.0	73,980.0	37,440.0	28,610.0	59,060.0
Growth rate (1978–2012)	93.4	216.1	566.2	335.2	755.0	4,140.1	435.1	1,169.0
Growth rate (2000–2012)	27.6	55.0	17.6	39.4	56.0	352.5	31.1	59.4

Source: Data for 1978–2011 is from *China Statistical Yearbook 2012*, data for 2012 is from *Statistical Communiqué of the People's Republic of China 2012*.

Figure 8.1 Outputs of major agricultural products during 2000–2012



Source: Data for 1978–2011 is from *China Statistical Yearbook 2012*, data in 2012 is from *Statistical Communiqué of the People's Republic of China 2012*.

Table 8.2 Key agricultural output per capita since 1978 (kg)

Year	Grains	Cotton	Oils	Pork, beef & lamb	Aquatic products	Milk
1978	319.0	2.3	5.5	9.1	4.9	
2000	366.1	3.5	23.4	37.6	29.4	6.6
2001	355.9	4.2	22.5	38.0	29.9	8.1
2002	357.0	3.8	22.6	38.5	30.9	10.2
2003	334.3	3.8	21.8	39.5	31.6	13.6
2004	362.2	4.9	23.7	40.4	32.8	17.4
2005	371.3	4.4	23.6	42.0	33.9	21.1
2006	379.9	5.7	20.1	42.7	35.0	24.4
2007	380.6	5.8	19.5	40.1	36.0	26.7
2008	399.1	5.7	22.3	42.4	37.0	26.8
2009	398.7	4.8	23.7	44.4	38.4	26.4
2010	408.7	4.5	24.2	45.8	40.2	26.7
2011	425.2	4.9	24.6	45.4	41.7	27.2
2012	435.4	5.1	25.7	54.6	43.6	27.7
Increment (1978–2012)	116.4	2.8	20.2	45.5	38.7	27.7
Increment (2000–2012)	69.3	1.6	2.3	17.0	14.2	21.1

Source: Data for 1978–2011 is from *China Statistical Yearbook 2012*, data for 2012 is from *Statistical Communiqué of the People's Republic of China 2012*.

Conditions of Agricultural Production have Improved

During the period 1978–2012, the agricultural sector witnessed increases in the level of integrated mechanisation, which rose by almost two times from 18.8 per cent to 56 per cent. The level rose by 10.2 percentage points during

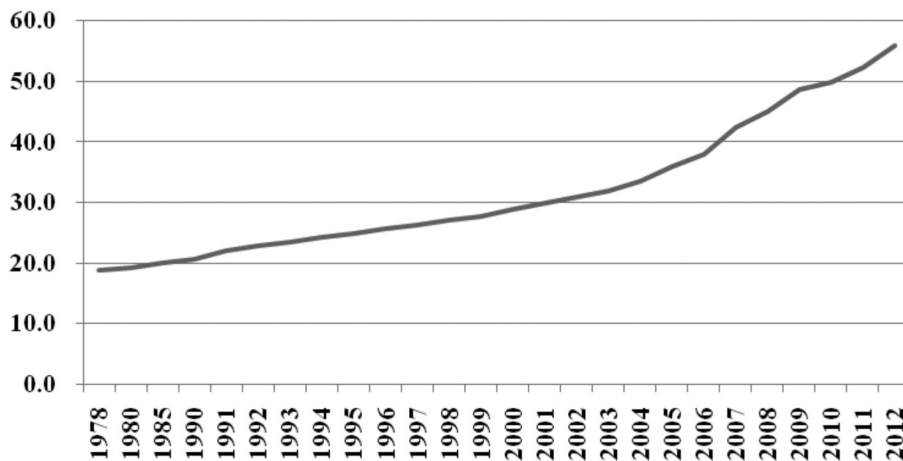
1978–2000 and 27 percentage points during 2000–2012. As shown in Figure 8.2 and Table 8.3, the level has risen more quickly since 2000. This rising level of integrated mechanisation has become an important factor underlying the steady growth of agricultural production.

Table 8.3 Changes in the level of integrated mechanisation (%)

Year	%	Year	%	Year	%	Year	%	Year	%
1978	18.8	1993	23.5	1998	27.0	2003	32.0	2008	45.0
1985	20.0	1994	24.2	1999	27.7	2004	33.5	2009	48.8
1990	20.7	1995	24.9	2000	29.0	2005	35.9	2010	50.0
1991	22.1	1996	25.6	2001	30.0	2006	38.0	2011	52.3
1992	22.8	1997	26.3	2002	31.0	2007	42.5	2012	57.0

Source: Data for 1978–2011 is from *China Agricultural Yearbook* 1979, 1986, 1991–2012; and data for 2012 is from a speech given by Taolin Zhang, Vice Minister of Ministry of Agriculture (MOA) at the national working conference on agricultural machinery purchase subsidy in Hangzhou on February 26, 2013.

Figure 8.2 Changes in the level of integrated mechanisation (%)



Source: Data for 1978–2011 is from *China Agricultural Yearbook* 1979, 1986, 1991–2012; and data for 2012 is from the Ministry of Agriculture.

Over the same period, the agricultural sector also witnessed a continuous expansion of effective irrigation areas. Table 8.4 shows the effective irrigation areas during the past decades, from which one can see that the area has expanded by over one-third from 45 million hectares (ha) in 1978 to more than 60 million in 2011.

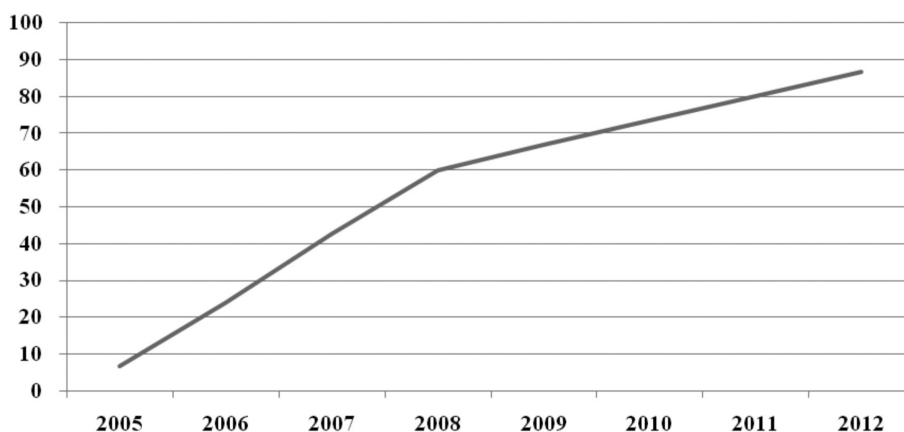
Table 8.4 Effective irrigation areas since 1978 (1,000 ha)

Year	Effective irrigation areas	Year	Effective irrigation areas	Year	Effective irrigation areas	Year	Effective irrigation areas
1978	44,965.0	1994	48,759.1	2000	53,820.3	2006	55,750.5
1985	44,035.9	1995	49,281.2	2001	54,249.4	2007	56,518.3
1990	47,403.1	1996	50,381.4	2002	54,354.9	2008	58,471.7
1991	47,822.1	1997	51,238.5	2003	54,014.2	2009	59,261.4
1992	48,590.1	1998	52,295.6	2004	54,478.4	2010	60,347.7
1993	48,727.9	1999	53,158.4	2005	55,029.3	2011	61,681.6

Source: *China Statistical Yearbook 2012*.

Fertilisation based on soil testing started to be used in 2005. Since then, the project has been implemented in all the agricultural counties (including state-owned farms). By 2012, the technology was being used on over 87 million ha, benefiting over two-thirds of the rural households in the country (Figure 8.3). A sampling survey at the household level shows that the technology could increase the production of wheat, rice and corn by 3.7 per cent, 3.8 per cent, and 5.9 per cent per ha, respectively; increase the sale income of grains, and vegetables and fruits by 450 yuan/ha and 1,500 yuan/ha, respectively. By 2011, fertilisation based on soil testing saved over seven million tons of fertiliser, by which the agricultural sector has saved the equivalent of 18.2 million tons of coal and reduced carbon dioxide emissions by 47.3 million tons.

Figure 8.3 Areas fertilising based on the soil tested (million ha)



Note: The areas in 2005 and 2006 are estimated based on the data in 2007.

Source: Ministry of Agriculture.

One can see from Table 8.5, because of the improvement in fertilising technologies, that the share of nitrogen in the total fertiliser used declined from 73.6 per cent in 1980 to 41.8 per cent in 2011, while the share of compound fertiliser (which improves the utilisation rate of nitrogen fertiliser) rose from 2.1 per cent to 33.2 per cent during the same period.

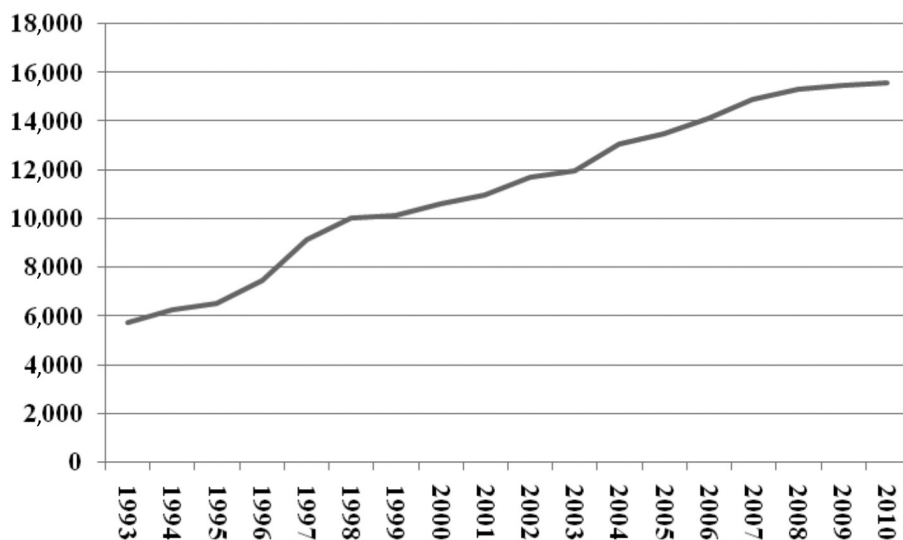
Table 8.5 Amount and composition of chemical fertilisers used in China, 1980–2011 (1,000 tons and %)

Year	Amount (1,000 tons)				Composing (%)				
	Nitrogen	Phosphorus	Potash	Compound	Total	Nitrogen	Phosphorus	Potash	Compound
1980	9,342	2,733	346	272	12,693	73.6	21.5	2.7	2.1
2000	21,615	6,905	3,765	9,179	41,463	52.1	16.7	9.1	22.1
2001	21,641	7,057	3,996	9,837	42,531	50.9	16.6	9.4	23.1
2002	21,573	7,122	4,224	10,404	43,323	49.8	16.4	9.7	24.0
2003	21,499	7,139	4,380	11,098	44,116	48.7	16.2	9.9	25.2
2004	22,219	7,360	4,673	12,040	46,291	48.0	15.9	10.1	26.0
2005	22,293	7,438	4,895	13,032	47,658	46.8	15.6	10.3	27.3
2006	22,625	7,695	5,097	13,859	49,276	45.9	15.6	10.3	28.1
2007	22,972	7,730	5,336	15,030	51,068	45.0	15.1	10.4	29.4
2008	23,029	7,801	5,452	16,086	52,368	44.0	14.9	10.4	30.7
2009	23,299	7,977	5,643	16,987	53,906	43.2	14.8	10.5	31.5
2010	23,537	8,056	5,864	17,985	55,443	42.5	14.5	10.6	32.4
2011	23,814	8,192	6,051	18,951	57,008	41.8	14.4	10.6	33.2

Source: China Statistical Yearbook 2012.

As shown in Figure 8.4, plastic-covered areas more than doubled over this period, from less than 6 million ha in 1993 to over 16 million ha in 2010. Also, the coverage of improved varieties of grains, cotton and oils expanded from 90 per cent in 2005 to 96 per cent in 2012.

Figure 8.4 Expansion of plastic-covered areas during 1993–2010 (1,000 ha)



Source: Ministry of Agriculture.

The agricultural sector has also demonstrated a tendency to increase regional concentration in the production of major agricultural products. As shown in Table 8.6, the share of grain production in the 13 major provinces (regions) rose from 69.21 per cent during 1949–1959 to 75.15 during 2000–1009 and further to 77.78 per cent during 2010–2012, increased by 5.94 and 8.57 percentage points, respectively. Zones have been created for the production of soybeans and corn in the north-east, nuts and wheat in the Huang–Huai–Hai region, oilseeds in the Yangtze watershed, and cotton in the Yellow River watershed and the north-west. In addition, pork produced in the 13 major provinces accounts for over 75 per cent of the country’s total production and the milk produced in the seven major provinces accounts for over 60 per cent of the country’s total production.

Table 8.6 Share of grains produced in the 13 major provinces in the total amount of the country (%)

Province	1949–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2009	2010–2012
Hebei	4.79	4.92	5.21	4.91	5.40	5.50	5.47
Inner Mongolia	1.99	2.09	1.70	1.52	2.57	3.33	4.12
Liaoning	3.48	3.26	3.76	3.25	3.28	3.35	3.42
Jilin	3.21	3.01	3.12	3.47	4.41	4.94	5.45
Heilongjiang	4.51	4.25	4.53	4.10	5.72	5.99	9.52
Jiangsu	6.57	6.95	7.15	8.02	7.01	6.21	5.78
Anhui	5.05	4.67	5.35	5.56	5.25	5.67	5.54
Jiangxi	3.41	4.03	3.81	3.87	3.49	3.62	4.07
Shandong	7.21	6.50	6.90	7.66	8.44	8.04	7.73
Henan	6.61	5.82	6.42	7.02	7.54	9.55	9.68
Hubei	5.21	5.63	5.47	5.54	5.18	4.51	4.16
Hunan	5.85	5.94	6.30	6.59	5.70	5.62	5.12
Sichuan	11.32	10.21	9.26	10.12	9.32	8.82	7.72
Total	69.21	67.28	68.98	71.63	73.31	75.15	77.78

Source: Data for 1949–1999 is from *Comprehensive Statistical Data and Materials on 50 Years of New China*; data for 2000–2011 is from *China Agricultural Yearbook 2001–2012*; and, data for 2012 is from National Statistics Bureau, *Grain Production Communiqué*, http://www.gov.cn/zwggk/2012-11/30/content_2279385.htm

Agricultural Total Factor Productivity (TFP) is Rising

Current research shows that the annual growth rate of China's TFP in the agricultural sector rose by around one percentage point during 1985–2010. According to information released by the Ministry of Agriculture, the contribution of technological progress to China's agricultural growth is 54.5 per cent in 2012 (Table 8.7). During 1985–2010, the annual growth rate of China's TFP was 3.8 per cent on average, of which the annual growth rate of agricultural technological progress is 5.1 per cent, while the annual growth rate of agricultural technical efficiency is –1.2 per cent. Obviously, the technological progress promotes the growth of China's TFP, while the decline in the technical efficiency partly offsets the effects of technological progress in enhancing productivity.

Productivity growth in China's agriculture is further estimated by dividing the whole period into four sub-periods (1985–1989, 1990–1995, 1996–2003, and 2004–2010) and by dividing the whole country into different regions (the major

and non-major agricultural production regions and the eastern, central and western regions), and the results are the same. China's TFP growth in the agricultural sector during this period, therefore, is mainly technology induced.

Table 8.7 China's agricultural TFP growth rate and its composition (1985–2010)

Year	Technical efficiency	Technology progress	TFP	Year	Technical efficiency	Technology progress	TFP
1986/1985	0.964	1.086	1.048	2001/2000	0.986	1.027	1.012
1987/1986	0.997	1.000	0.996	2002/2001	1.006	0.990	0.996
1988/1987	0.978	1.077	1.053	2003/2002	0.976	1.092	1.066
1989/1988	1.008	1.039	1.047	2004/2003	0.997	1.125	1.122
1990/1989	1.007	1.025	1.033	2005/2004	0.970	1.055	1.023
1991/1990	0.972	1.014	0.986	2006/2005	1.208	1.050	1.269
1992/1991	0.939	1.052	0.987	2007/2006	0.808	1.074	0.868
1993/1992	0.988	1.165	1.150	2008/2007	0.997	1.103	1.100
1994/1993	0.979	1.120	1.097	2009/2008	1.021	1.030	1.052
1995/1994	1.047	1.096	1.147	2010/2009	0.992	1.028	1.020
1996/1995	0.989	1.061	1.049	1989/1985	0.983	1.058	1.036
1997/1996	0.954	1.030	0.982	1995/1990	0.988	1.077	1.064
1998/1997	0.992	0.952	0.944	2003/1996	0.987	1.015	1.001
1999/1998	1.025	0.970	0.994	2004/2010	0.993	1.066	1.059
2000/1999	0.966	1.008	0.973	2010/1985	0.988	1.051	1.038

Note: The national index is the geometric mean of the provincial indexes.

Source: *China Statistical Yearbook* 1986–2011; Li and Zhang (forthcoming).

The question is, then, whether the agricultural sector has room for further improving technical efficiency, rather than continuously relying on the expansion of economies of scale. As shown in Table 8.8, technical efficiency in China's grain production is 0.795, which shows that significant room remains for further improvement. On the other hand, the economies of scale is already 0.957, and room for further improvement is not substantial. Increasing total land areas may, however, help with increasing farmers' income. There are almost no remarkable economies of scale in the production of wheat, rice and corn (Xu et al. 2011). Expanding the land scale would have a significant effect on the reduction of production costs. Each additional mu (1/15 ha) in the scale expansion could reduce the cost by two to ten per cent. That means that the scale expansion would notably raise the farmers' income (Xu et al. 2011).

Table 8.8 Efficiency in China's grain production by regions

Region	Technical efficiency	Scale efficiency	Region	Technical efficiency	Scale efficiency	Region	Technical efficiency	Scale efficiency
Beijing	0.766	0.999	Anhui	0.786	0.878	Sichuan	0.861	0.810
Tianjin	0.745	0.980	Fujian	0.795	0.940	Guizhou	0.708	0.940
Hebei	0.748	0.907	Jiangxi	0.834	0.995	Yunnan	0.574	0.998
Shanxi	0.570	0.984	Shandong	1.00	0.905	Tibet	1.00	1.00
Inner Mongolia	0.719	0.951	Henan	1.00	0.831	Shaanxi	0.524	0.985
Liaoning	0.868	0.993	Hubei	0.864	0.954	Gansu	0.536	0.974
Jilin	1.00	1.00	Hunan	0.908	0.971	Qinghai	0.623	0.960
Heilongjiang	1.00	1.00	Guangdong	0.796	0.951	Ningxia	0.625	0.997
Shanghai	1.00	1.00	Guangxi	0.698	0.966	Xinjiang	0.954	0.957
Jiangsu	0.989	0.938	Hainan	0.648	0.961			
Zhejiang	0.917	0.969	Chongqing	0.596	0.980	Total	0.795	0.957

Source: Yang and Qian 2009.

Farmers' Contributions to Growth of Agricultural Production

Under the planned economic system, farmers are required to live in rural areas, be engaged in agricultural production, and participate in collective production. Agricultural productivities are low under that system because of the absence of incentives for farmers to work hard. The key to rural reform is to empower farmers through institutional and policy changes. During the early stage of reform, farmers were granted the right to make decisions on their own production. This had tremendous incentive effects and farmers quickly solved the problem of agricultural shortages. During the mid 1980s, farmers were empowered with the right to be engaged in non-agricultural industries. This allowed farmers to engage in substantial off-farm opportunities, and they created the miracle of township and village enterprises (TVEs), which occupy half of the country's industry. Since the 1990s, farmers have been empowered with the right to be employed in the urban areas; this has led to large-scale rural–urban migration, with farmers soon becoming the major force in China's working class. For the next period of development, farmers should be empowered with the right to be integrated into urban life, and to participate in managing urban affairs.

Table 8.9 shows that the number of farmers employed in non-agricultural sectors more than quadrupled from 59.6 million in 1985 to 262.61 million in 2012. Table 8.10 illustrates that, of the total farmers employed outside agriculture, almost half leave the land individually, while the other half are those who are employed in the local areas or with their families in other areas. These statistics underline social problems arising from rural–urban migration, as many migrant workers have moved to the cities on their own, leaving their families in rural homes.

With the expansion of employment opportunities, the contribution of farmers to China's national economy has extended from agricultural to non-agricultural sectors and from rural to urban areas. As shown in Table 8.11, from 2008 to 2012, the share of GDP created by farmers employed outside agriculture in the country's GDP rose from 32.1 per cent to 38.6 per cent, 6.5 percentage points increase in four years. The farmers' contribution to GDP would be bigger if one takes into account the income earned by selling cheap farmland to the government, which is then sold on to business at much higher prices.

Table 8.9 Farmers employed in urban areas (1,000 person)

Year	Number	Year	Number	Year	Number	Year	Number	Year	Number	Year	Number
1985	59,600	1990	88,660	1995	133,860	2000	128,910	2005	14,5240	2010	242,230
1986	67,770	1991	91,370	1996	142,660	2001	125,720	2006	155,290	2011	252,780
1987	73,860	1992	99,640	1997	141,980	2002	120,900	2007	161,960	2012	262,610
1988	78,700	1993	113,500	1998	138,440	2003	122,470	2008	225,420		
1989	77,690	1994	122,970	1999	132,140	2004	134,550	2009	229,780		

Source: National Statistics Bureau.

Table 8.10 Farmers employed outside agriculture during 2008–2011 (1,000 person, %)

Year	Total	Employed in other areas				Employed locally		
		Subtotal	Individual	%	With family	%	Number	%
2008	2,254,200	1,404,100	1,118,200	49.6	285,900	12.7	850,100	37.7
2009	2,297,800	1,453,300	1,156,700	50.3	296,600	12.9	844,500	36.8
2010	2,422,300	1,533,500	1,226,400	50.6	307,100	12.7	888,800	36.7
2011	2,527,800	1,586,300	1,258,400	49.8	327,900	13.0	941,500	37.2
2012	2,626,100	1,633,600					992,500	

Source: National Statistics Bureau.

Table 8.11 Changes in the shares of GDP created by the farmers employed outside agriculture in the country's total GDP

Year	Farmers employed outside agriculture (1,000)	Average remuneration (yuan/month)	Total remuneration (billion yuan)	GDP created by the farmers (billion yuan)	Country's GDP (billion yuan)	Share of the farmers' GDP in the total %
2008	225,420	1,340	3,624.75	10,068.76	31,404.54	32.1
2009	229,780	1,417	3,907.18	10,853.28	34,090.28	31.8
2010	242,230	1,690	4,912.42	13,645.62	40,151.28	34.0
2011	252,780	2,049	6,215.35	17,264.87	47,288.16	36.5
2012	262,610	2,290	7,216.52	20,045.90	51,932.20	38.6

Note: The remuneration of the farmers employed outside agriculture roughly accounts for 36 per cent of the GDP.

Source: National Statistics Bureau.

Farmers' Income is Rapidly Increasing

From 1978 to 2012, farmers' per capita income increased from 133.6 yuan to 7,917 yuan, a 10.77 times increase at constant prices. During the same period, urban residents' per capita disposable income rose from 343.4 yuan to 24,565 yuan, a 10.46 times increase at constant prices. This means that farmers' and urban residents' incomes are growing at basically the same rates over the entire reform period. Judged by this statistic, it may not be accurate to argue that the income difference between rural and urban residents has expanded, even though the absolute levels of per capita income between rural and urban residents are different. In recent years, the growth rate of rural incomes has been faster than that of urban incomes. There are a number of factors which have led to a more rapid increase in farmers' incomes.

First, distortions in agricultural prices have been eliminated through reform and price liberalisation, which enables farmers to work harder to benefit more from market prices. Agricultural taxes were abolished in 2005. At the same time, government agricultural subsidies are increasing. These changes have substantially increased farmers' incomes and contributed to narrowing the difference between urban and rural incomes.

Second, the income of farmers employed in non-agricultural sectors is underestimated. Farmers usually regard the money that they take back home as their income, but ignore the money that they have spent in the urban locations in which they are employed. In total there are 160 million Chinese farmers employed outside their hometown. If one of them spends 2,000 yuan a month in their place of employment, then the living costs for those 160 million farmers is 320 billion yuan per month. This money can be converted to an average per capita income of 300 yuan for all the farmers in China, but this amount is not currently included in calculating the total income of farmers.

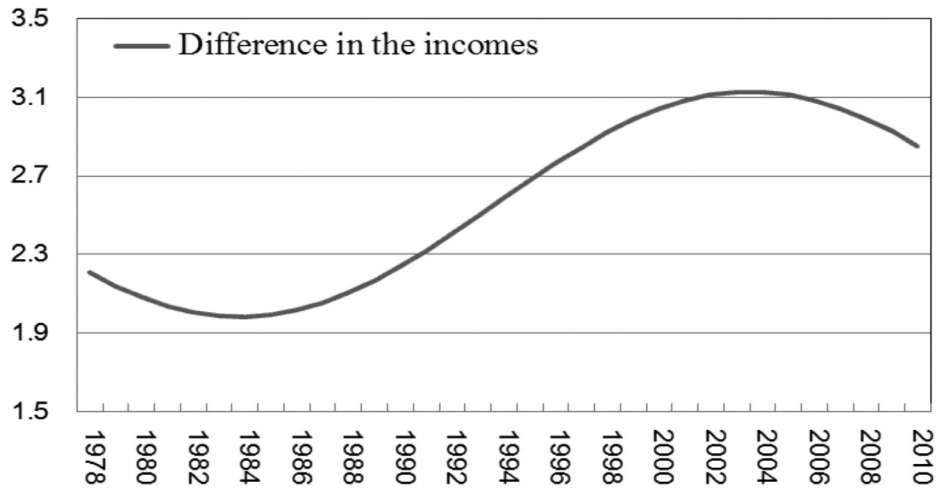
Third, calculations of the income of urban residents includes government subsidies for housing and medical treatment, and this inflates the urban income. As a result, estimates based on provincial-level data show that the ratio of urban to rural nominal income goes down (Table 8.12 and Figure 8.5). Because of this, increasingly, farmers prefer to maintain their administrative status as rural, rather urban, residents. This change in attitude on the part of farmers reflects the narrowing of the difference between rural and urban incomes, and that working conditions in rural areas continue to improve due to the policy changes towards the sector.

Table 8.12 Comparison of the incomes of farmers and urban residents since 1978

Year	Farmers' net income (per capita)		Urban residents' disposable income (per capita)		Income ratio
	Amount (yuan)	Index (1978 = 100)	Amount (yuan)	Index (1978 = 100)	
1978	133.6	100.0	343.4	100.0	2.6
1980	191.3	139.0	477.6	127.0	2.5
1985	397.6	268.9	739.1	160.4	1.9
1990	686.3	311.2	1,510.2	198.1	2.2
1991	708.6	317.4	1,700.6	212.4	2.4
1992	784.0	336.2	2,026.6	232.9	2.6
1993	921.6	346.9	2,577.4	255.1	2.8
1994	1221.0	364.3	3,496.2	276.8	2.9
1995	1577.7	383.6	4,283.0	290.3	2.7
1996	1926.1	418.1	4,838.9	301.6	2.5
1997	2090.1	437.3	5,160.3	311.9	2.5
1998	2162.0	456.1	5,425.1	329.9	2.5
1999	2210.3	473.5	5,854.0	360.6	2.6
2000	2253.4	483.4	6,280.0	383.7	2.8
2001	2366.4	503.7	6,859.6	416.3	2.9
2002	2,475.6	527.9	7,702.8	472.1	3.1
2003	2,622.2	550.6	8,472.2	514.6	3.2
2004	2,936.4	588.0	9,421.6	554.2	3.2
2005	3,254.9	624.5	10,493.0	607.4	3.2
2006	3,587.0	670.7	11,760.0	670.7	3.3
2007	4,140.4	734.4	13,786.0	752.5	3.3
2008	4,760.6	793.2	15,781.0	815.7	3.3
2009	5,153.2	860.6	17,175.0	895.4	3.3
2010	5,919.0	954.4	19,109.0	965.2	3.2
2011	6,977.0	1,063.2	21,810.0	1,046.3	3.1
2012	7,917.0	1,177.0	24,565.0	1,145.7	3.1

Source: Data for 1978–2011 is from *China Statistical Yearbook 2012*, and data for 2012 is from *Statistical Communiqué of the People's Republic of China 2012*.

Figure 8.5 A fitting curve of the ratio of urban to rural per capita incomes using provincial-level data during 1978–2010



Source: Data for 1978–1999 is from *Comprehensive Statistical Data and Materials on 50 Years of New China*, and data for 2000–2010 is from *China Agriculture Yearbook 2001–2011*.

Farmers’ Welfare is Improving

Besides rapid increases in income, farmers’ welfare is also improving. First, development of the economies of the central and western regions and the counties has created more opportunities for farmers to be employed in their local areas. This might not raise farmers’ incomes to the same level that can be earned in the cities, but the quality of life of the farmer and the extended family is significantly improved by remaining in the local area. Changes in government policies in favour of the agricultural sector have accordingly improved the welfare of farmers.

Second, the outsourcing of agricultural production is now substituting for the work of farmers’ families. Contracting out farm work to others increases the family’s production expenditures, but reduces the family’s labour intensity on farm and household work, thereby improving their welfare and quality of life.

Third, the market-oriented services that are increasingly available to farmers are substituting for housework. This substitution obviously raises the family’s spending on food and other consumption items, and inhibits the decline of the Engel coefficient, as one would normally see with rising income. As a result, however, families have more leisure time and consequently experience a remarkable improvement in their welfare.

Major Achievements in the Rural Development

For the past decade, 2002–2012, with the improvement of China's agricultural policies, there have been notable achievements in rural development, especially in terms of farmers' income, agricultural production, the environment and social change.

From Collecting Agricultural Surplus to Supporting Agricultural Development

Before tax and fee policy reform in 2005, village committees and local governments collected 150–160 billion yuan per year from farmers in agricultural, livestock, special agricultural product taxes, and 'three retained fees', 'five overall planned fees', and unwanted pooling of funds.² Agricultural taxes accounted for around one-third of the total taxes collected by the government.

Since 2004, the central and provincial governments issued a series of policies, including the provision of direct subsidies for grain production, improved varieties of agricultural products, purchases of large-scale farm machinery, and agricultural production inputs. As shown in Table 8.13, only the direct subsidies for grain production have remained stable since 2007, while the others have increased to the significant benefit of farmers.

Table 8.13 The central government's subsidies to agriculture (billion yuan)

Year	Total	Subsidies for the input	Direct subsidies for grain production	Subsidies for improved varieties	Subsidies for farm machinery
2003	13.00	–	–	–	–
2004	14.52	–	11.60	2.85	0.07
2005	17.37	–	13.20	3.87	0.30
2006	30.95	12.00	14.20	4.15	0.60
2007	51.36	27.60	15.10	6.66	2.00
2008	103.04	71.60	15.10	12.34	4.00
2009	127.45	79.50	15.10	19.85	13.00
2010	122.59	70.59	15.10	20.40	16.50
2011	140.6	86.00	15.10	22.00	17.50
2012	166.4	107.80	15.10	22.00	21.50

Source: Ministry of Finance.

² The Chinese Government started reforming agricultural and rural tax and fee policies in 2003 and the reform task was basically completed by the end of 2004, leading to the abolition of agricultural tax in 2005.

From General Support to Key Specific Support by the Governments

From the start of the reform process, the central government's policies were general and applied consistently across the country. Later, in order to promote the formation of agricultural production zones, some key support policies were implemented. For instance, since 2005 a policy has been implemented to reward the governments of counties for meeting grain-production targets (Table 8.14). Since 2007 the policy has been expanded to include a target for the sale of hogs outside the county (1.5 billion yuan per year) and, since 2008, a target of 2.5 billion yuan per year has been set for the production of oils. Guided by industrial policies, agricultural production is concentrating on these favoured areas, and the zoning production of the key agricultural products is more and more obvious.

Table 8.14 The central government's special funds for rewarding the governments of counties where a certain amount of grains are produced

Year	2005	2006	2007	2008	2009	2010	2011
Funds (billion yuan)	5.5	8.5	12.5	14.0	17.5	21.0	22.5

Source: Ministry of Finance.

From Promoting Production to Protecting the Environment

In the past decade, the Chinese Government began to pay more attention to ecological protection and addressing environmental concerns, issuing policies to protect forest, grassland and wetland systems.

In order to eliminate the negative impacts of deforestation on the environment, in 1998 the Chinese Government implemented a natural forest protection project. The project was implemented in the upper Yangtze River, the middle and upper Yellow River, the north-eastern regions and Inner Mongolia, and other state-owned natural forest areas. The project will be implemented in different phases, the first of which was divided into two stages. The first stage, from 2000–2005, had the major tasks of stopping deforestation of natural forests, constructing ecological forests, and redeploying individuals who lost jobs because of the policy. The second stage ran from 2006 to 2010 and the major tasks were to protect the natural forests, recover vegetation, and promote sustainable development. The total investment in the project is 96.2 billion yuan and it has resulted in the protection of 56 million ha of natural forests, the establishment of 15.27 million ha of afforestation, and an increase in forest stocks of 460 million cubic metres.

In 2011, the project entered into the second phase with a planned investment of 244 billion yuan. The main goals are to, by 2020, increase the ecological forests by 7.7 million ha and other forests by 5.2 million ha, forest stocks by 1.1 billion cubic meters, and carbon sequestration by 416 million tons. The project also aims to increase biodiversity significantly, and to maintain social stability in forest areas.

The project of converting cropland to forestland started in 1999. In all China's ecological construction projects, this one has received the greatest investment and covers the most extensive areas. The investment for the first phase is 224.5 billion yuan and involves planting trees on croplands and barren areas and closing the hillsides to facilitate the growth of forests. Forest areas have been increased by 24.27 million ha and forest coverage has risen by over two percentage points on average. In 2007, when the government policy of subsidising grains and living costs expired, the government added 206.6 billion yuan to subsidise the farming households that are involved in implementing the project. The total investment is 431.1 billion yuan during the two phases of project implementation.

In addition, China also implemented projects involving forest shelterbelts, dust-storm source control around Beijing, wildlife conservation, natural reserves, and fast-growing and high-yield timber forests. Promoted by these projects, China's forest area has increased by 60.4 per cent from 121.86 million ha to 195.45 million ha, the stumpage volume has increased by 56.5 per cent from 9.53 billion m³ to 14.91 billion m³, and the forest-coverage ratio rose from 12.70 per cent to 20.36 per cent over the period 2000–2010.

Table 8.15 shows the results of the six major forest projects. One can see that carbon sequestration increased by 338.22 million ton per year, of which 175 million tons is produced by the new forests, accounting for over 50 per cent of the total carbon sequestration.

China has also amended development strategies for pastoral areas and changed the focus from agricultural production to preservation of grasslands and animals. The goal is to increase agricultural efficiency and preserve the natural environment by limiting grazing areas and fencing grasslands. This policy shift has helped China to complete the transformation from focusing purely on economic growth to focusing on ecological systems and economic development. By so doing, China has given a higher priority to the environment.

Table 8.15 Area and carbon sequestration of the six major forest projects during 2000–2010

Project	Total forest		New forest	
	Area (1,000 km ²)	Carbon sequestration rising by year (million t)	Area (1,000 km ²)	Carbon sequestration rising by year (million t)
Converting cropland to forestland	319.8	73.46	273.0	71.08
Dust storm source control around Beijing	49.4	11.13	31.7	7.13
Natural forest protection	388.8	94.99	83.9	18.99
Forest shelterbelts	344.0	95.46	142.7	37.60
Fast-growing and high-yield timber	133.3	40.20	133.3	40.20
Natural reserve	9.74	22.98	0	0
Total	133.27	338.22	66.46	175.00

Source: State Forestry Administration.

During 2003–2010, the total investment in the protection of grasslands was 14.3 billion yuan, of which 10 billion yuan was subsidised by the central government and 4.3 billion yuan was matched by local governments. The policy subsidises ranchers with a seasonal payment of 82.5 kg/ha per year of grains (around 74.25 yuan/ha per year) for nine months, and 20.625 kg/ha per year of grains (around 18.56 yuan/ha per year) for three months. The ranchers are subsidised with a payment of 247.5 yuan/ha for fencing. The subsidy period runs for five years.

In order to intensify conservation of grasslands, China also aims to change the style of animal husbandry, to promote the ranchers' continuous increase in income, and to maintain the country's ecological safety. Since 2011, the central government has allocated 13.6 billion yuan/year to subsidise and reward grassland conservation in Inner Mongolia, Xinjiang, Tibet, Qinghai, Sichuan, Gansu, Ningxia, and Yunnan. The activities and reward standards are:

1. A 90 yuan/ha subsidy to ranchers for stopping grazing in heavily degraded grassland areas.
2. Ranchers who graze within an established grazing capacity are rewarded with a payment of 22.5 yuan/ha.

3. Ranchers who produce on the 6 million ha artificial grassland within the eight provinces are subsidised with a payment of 150 yuan/ha for their use of improved varieties of livestock and grass. The two-million rancher households in the eight provinces are subsidised with a total payment of 500 yuan/household for their production inputs.

In total, the area in which grazing is forbidden now covers 29.3 million ha. According to results provided by the Ministry of Agriculture, the coverage, height and production of grass in the project area has increased 29 per cent, 64 per cent, and 78 per cent than those in the non-project areas, respectively.

During the 1950s–1970s, a large number of lakes in China were converted to farmland, as a result of concerns about grain shortages. Since the mid 1980s, China reached food self-sufficiency and the government started to implement a policy of converting cropland back to lakes, which altered China's 1,000-year history of converting lakes to farmland.

The Plan of National Wetland Conservation (2002–2030) proposes that over 90 per cent of natural lakes would be effectively conserved and protected by 2030, enhancing wetland systems and reaching the target of sustainable use of wetland resources.

From Economic to Social Development

With the increasing strength of the national economy, China has strengthened the implementation of the free and compulsory education system, and cooperative medical care in rural areas. The government has also tried to realise equalisation in financing infrastructure supply, providing minimum living security, and a social pension system in rural areas.

The free and compulsory education system started to be implemented in 2006. The system includes that, during the compulsory education period, all rural students' tuition and fees are waived, students from poor families are provided with textbooks and the living expenses of boarders from poor families are subsidised. Public funds for rural primary and secondary schools have increased and funds for the maintenance and reconstruction of rural primary and secondary schools, and teachers' salaries, are guaranteed.

This system was implemented in parts of the western and central regions in 2006 and extended to the whole country in 2007. Government payments for the 'two exemptions and one subsidy' reduced the over-230 billion yuan being spent by rural families on education, cutting 250 yuan/year in education costs and 390 yuan/year of expenses for families with a student at a primary and secondary school.

At present, the net enrollment rate in China's primary schools is 99.5 per cent; the gross enrollment rate in the secondary schools is 98.5 per cent, 13 and 20 percentage points higher than the world average level, respectively, and close to the levels in the developed countries.

Since 2003, a new type of cooperative medical care has been promoted. By the end of 2011 the program covered 832 million rural residents in 2,637 counties, accounting for 97.5 per cent of the rural population. The total fund raised for the program reached 204.76 billion yuan in 2011, with the per capita level reaching 246.2 yuan. The total payments were 171.02 billion yuan, with the total beneficiaries numbering 1.315 billion person-time. Of the beneficiaries, hospital treatments were provided for 700 million person-time; general outpatients numbered 1.167 billion person-time, effectively reducing the economic burden on farmers for medical treatments.

By 2012, the participation rate in cooperative medical care has risen to 98.1 per cent. In the beginning, the standard payment was 30 yuan per capita, of which the government subsidised 20 yuan, while the participants paid 10 yuan. In 2012, the payment rose to 300 yuan per capita, of which the government subsidised 250 yuan.

As for the provision of the rural infrastructure, a key focus is the provision of safe drinking water. There are two objectives in this plan. The first, which was achieved in 2000, related to quantitative security whereby rural residents always have ready access to drinking water. The second objective is to achieve qualitative security. In 2000, there were 379 million rural residents without access to safe drinking water. During the tenth five-year plan period, conditions were improved for 67 million rural residents. During the 11th five-year plan period, another 213 million rural residents could access safe drinking water. It is anticipated that the second objective will be achieved in 2013.

Rural infrastructure extends to electricity supply, for which there are three objectives. The first objective, which was achieved in 1997, was the provision of electricity to all counties, almost all the townships and villages, and 95 per cent of the country's rural households. The second objective, achieved by the end of the 11th five-year plan period, was to improve the reliability of electricity supply in rural areas and lower the cost of electricity for rural consumers. The third objective is that rural residents experience parity with urban residents for supply and cost of electricity. This will be achieved by updating the rural electricity grids, which is anticipated to take place during the 12th five-year plan period.

The objective of rural road construction has been regularly updated. The first objective, which was achieved by the end of the 20th century, involved the provision of roads suitable for motor vehicles. The second objective, basically achieved during the 11th five-year plan period, is that all towns and villages would have all-weather road access. The present objective is about the integration of urban and rural road networks.

The government has also focused on the provision and improvement of rural communication infrastructure by the construction of television, telephone, and internet infrastructure.

In 1996 China started implementing pilot projects to address minimum living security in a couple of provinces and cities. In 2007, the project extended to all the country's rural areas (Table 8.16). The procedure involves a farmer submitting an application to a village committee, which considers the candidates' financial conditions. The application from approved candidates is sent to the township government for verification and the result is sent to the county bureau of civil affairs, which approves or rejects the application. In order to guarantee fairness and transparency, all levels of assessment are responsible for publicising the results of their deliberations.

During 2006–2010, the country started providing the social pension system to rural aged people aged over 60. By 2011, in the pilot project areas, around 326 million rural aged residents participated in the project, of which 85.25 million received the pension. The implementation of the rural social pension system reflects two fundamental changes: one is a shift from relying on farmers' posterity and land to their family income; and the other is a shift from aged people relying on their families to depending on the society.

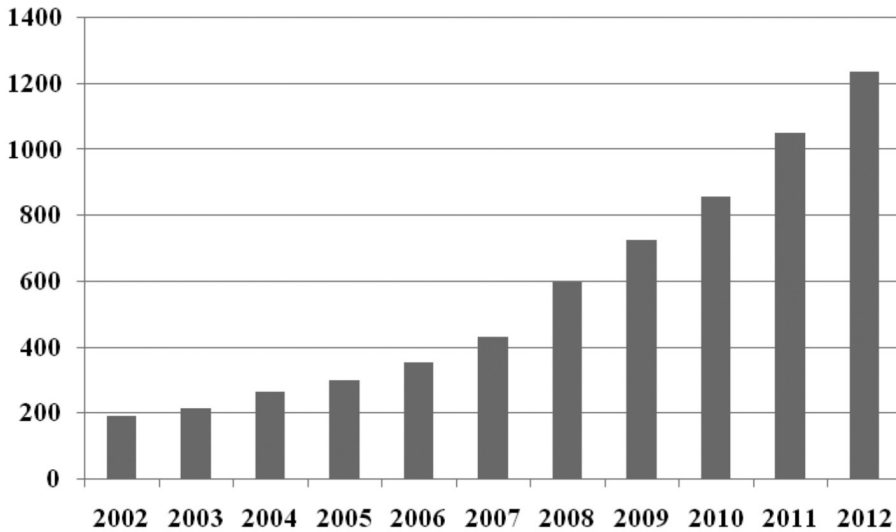
Overall, the government's expenditure on agriculture and rural development is rapidly increasing over time. Figure 8.6 shows the increasing trend of the central government's total expenditure on agriculture, farmers and rural areas. One can see that, since 2002, expenditure has been continuously rising. The amount increased from 190.5 billion yuan in 2003 to 1,238.7 billion yuan in 2012, a rise from 13.7 per cent to 22.1 per cent of China's total expenditure.

Table 8.16 Improvement in the minimum living security: 2001–2011 (1,000 persons, billions yuan)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Households (1,000)	1,179	1,567	1,768	2,359	4,061	7,772	16,085	19,822	22,917	25,287	26,728
People (1,000)	3,046	4,078	3,671	4,880	8,250	15,931	35,663	43,055	47,600	52,140	53,057
Funds (billion yuan)							10.91	22.87	36.30	44.50	66.77
Standard (yuan/month)						70.0		82.3	100.8	117.0	143.2

Source: Ministry of Civil Affairs.

Figure 8.6 Central government's expenditure on agriculture, farmers, and rural areas: 2002–2012 (billion yuan)



Source: Ministry of Civil Affairs.

New Challenges Faced by the Rural Sector

Despite these tremendous achievements in rural sector development, the agricultural and rural sector in China faces important challenges. Confronting these challenges will determine the way by which the agricultural sector will further develop and, more importantly, how agricultural development will contribute to China's future economic growth and social development and stability. These challenges are outlined below.

Coping with the Decline in Agricultural Competitiveness

In recent years, China's net imports of agricultural products has increased. Locally grown soybean, a land-intensive product, is largely substituted by foreign supplies. Corn imports are also increasing, as are imports of rice and cotton, which are labour-intensive. There are three reasons for the decline in the competitiveness of China's agriculture. The first is the rising cost of agricultural labour. In reality, young adults are employed outside agriculture or local areas, and those left to undertake rural labour are the elderly, women and children.

The rural population is also made up of landlords, who contract out their lands to professional farmers. Most of the mechanical ploughing, sowing and harvesting is conducted by professional farmers who provide outsourcing services.³

Table 8.17 shows that the production of rice, wheat and corn in China only needed 177.8, 121.5, and 149.6 working days per ha in 2004, respectively. The amount of labour for producing these three crops declined to 117.3, 84.6 and 110.0 working days per ha in 2010, respectively. During the same period, labour costs rose from 2,571.6, 1,677.6, and 2,107.4 yuan per ha to 3,998.7, 2,682.5, and 3,526.5 yuan per ha. The cost of land also continues to increase. With the expansion in the scale of land transfer, particularly because the demand for land transfer is greater than the supply, land transfer costs have risen to 9000–12000 yuan/ha. The costs of other production inputs have also risen over time. As these three factors may persist, it will be a challenge for China to manage the decline in its agricultural competitiveness.

Table 8.17 Labour and labour costs in the production of rice, wheat and corn per ha

	Labour (days)			Cost of labour (yuan/mu)		
	2004	2010	Decline (%)	2004	2010	Increase (%)
Average	149.6	104.0	30.5	2,118.9	3,402.6	60.6
Rice	177.8	117.3	34.0	2,571.6	3,998.7	55.5
Wheat	121.5	84.6	30.4	1,677.6	2,682.5	59.9
Corn	149.6	110.0	26.5	2,107.4	3,526.5	67.3

Source: Materials of Agricultural Costs and Returns, China Agricultural Production Cost and Benefit data Collection 2005, and 2011.

Reducing Farming Intensity

China's agriculture is moving from a traditional to a modern system. Traditionally, agriculture pursued maximum productivity, and additional inputs stop at the point where the marginal product is zero. Modern agriculture pursues maximum profit, and additional inputs stop at the point where they equal marginal revenue. Comparing modern with traditional agriculture, marginal inputs tend to be higher than marginal outputs. For this reason, the decline in farming intensity is typical of modern agriculture and is observable in China in the decision of farmers to change from double to single cropping on two-quarters of the agricultural land.

3 Rural households make the logical decision to encourage their young adult members to seek employment outside agriculture; at present, land holdings are too small for farmers to be fully employed. Productivity levels under a reformed agricultural system need to be determined over time and, that being the case, outsourcing arrangements can help farmers to be fully employed, which is a win-win system.

Changing from double to single cropping has three advantages. First, the farmer's income increases, resulting from higher prices caused by reduced output. In 2006, the net profit of double-cropping rice was 3,813.7 yuan/ha, while the net profit of single-cropping rice was 4,504.5 yuan/ha. Second, single cropping saves inputs, such as irrigation, fertiliser and pesticides. Third, one season fallow is conducive to maintaining the fertility of the land. Clearly, the disadvantage in single cropping is the decline in the total output on a unit of farmland, but the extent of decline in the total output is less than the extent of decline in the seeded area. During 1998–2006, in two-quarters of the agricultural area, the area of double-cropping rice decreased by 13 per cent, while the total output of rice decreased by only 5.4 per cent. Considering the fact that less seeds are needed in single cropping, there is an impact on the volume of grain available for consumption. It is unlikely that there will be a reversal of the current trend in agricultural production intensities.

The fertility of land is limited both physically and ecologically. The intensity of farming and multiple cropping indexes is not, therefore, a case of more being better. At the early stage of reform, some places even practiced triple cropping, which was a response to profit incentives. In the future, the traditional concept that planting should be practiced in any crop growing season must be abandoned. The traditional thinking that while a fallow season maintains soil fertility but leaves the land uncultivated for no income, must be changed. When food is relatively scarce, the country could subsidise farmers to produce grains by double cropping; when food is relatively abundant, the choice to single crop must be respected.

Promoting the Economy of Scale in Production

The promotion of scale operations in agricultural production by transferring rights to farmland between farmers and/or between farmers and enterprises should be an important part of agricultural transformation, and also a key measure to enhance the competitiveness of China's agriculture and the economies of scale. Farmers, however, pay some attention to the economies of scale, but also are concerned about the risk involved in sharing the benefits derived from increased economies of scale. That is the major reason why a lot of economies of scale have not developed. In addition, the obstacles faced by farmers in migrating to cities and non-agricultural industries have not been completely eliminated; the social security system has not been fully established. These are the factors that currently restrict land transfer. The challenge is to ensure that farmers do not risk losing their land rights, that they are provided with a stable source of income should they choose to be employed in non-agricultural sectors,

and that social security can be regarded as an adequate substitute for land security. Before this happens, it is not realistic to expect farmers to recognise the advantages of increasing scale operation in production.

As mentioned earlier, for grain production, the major benefits of land scale operation are reducing the costs and increasing the income, but the role of raising grain production to increase farmers' income is limited. In reality, most land transfer is related to land that is not used for grain production. The operation scale must be considered in the context of particular locations, including their economic, social and institutional conditions, instead of taking the agricultural operation scale in other countries or regions as a benchmark for China.⁴

Besides the scale operation, there are other measures that could increase agricultural efficiency:

- actively guiding farmers to cooperate in the purchase of production factors, land consolidation, construction and maintenance of agricultural infrastructure
- adopting advanced agronomic measures
- establishing and improving agricultural equipment and outsourcing services
- optimising industrial patterns and updating industrial structures.

The difficulties in implementing these measures are smaller than those related to the issue of land transfer practices. These measures should, therefore, be the first choices for the government to adopt in order to increase agricultural productivity.

Promoting Cooperation between Farmers

In theory, at least, there are many advantages in farmers working in cooperation. In reality, however, there are many obstacles to hamper such cooperation. First, rural so-called elites will use government policies to generate personal benefits, but they are unwilling to help other farmers. This is the major reason why it is difficult for farmers to cooperate with each other. Second, outsourcing of services could meet the farmers' demand for mechanical ploughing, sowing, and harvesting. This is a form of cooperation on which a farmer can rely that is based on a market mechanism. Third, agricultural enterprises are based on enterprises + households, and this structure has the effect of making farmers' cooperatives redundant. The challenge is to coordinate cooperative arrangements for the benefit of farmers.

4 In general, agricultural scale is larger in immigrant societies, such the United States, Australia, Canada, Brazil, Argentina, and north-eastern China and Xinjiang, and smaller in non-immigrant societies.

Strengthening the Management of Food Consumption

In 2012, China's production of grain, meat, and aquatic products were 435 kg per capita, 54.6 kg per capita, and 43.6 kg per capita, which is higher than the world average (332.7 kg per capita, 42.1 kg per capita, and 22.1kg per capita) by 30.7 per cent, 29.7 per cent, and 97.3 per cent, respectively. China's production of vegetables and fruits per capita is also higher than the world average level. Nevertheless, because management of production is not well developed, there is significant waste and excessive consumption, which leads to waste of agricultural resources. The challenge is to how effectively solve these problems and ensure the sustainable development of China's agriculture.

The measures that need to be taken include improvement of equipment for and conditions of grain storage (to reduce loss), establishing standards for grain processing, and raising awareness of the relationship between both diet and health, and agriculture and environmental degradation.

Protection of Farmers' Land Rights following Urbanisation

In the early phase of urbanisation in China, new cities and towns were mainly built on farmland. Fearful of losing too much farmland, the central government has been strengthening the management of farmland, and construction of the urban areas has been focusing more on transformation of old cities and towns. The space in established urban areas is limited, and the costs of transformation are high; thus, construction of urban areas has been moving towards consolidation of construction (non-farm) land in rural areas. There are key policy implications related to the further development of urban areas on rural land so as to accommodate more migrants.

First, the construction of urban areas on consolidated rural land should be undertaken in stages. According to our survey, however, some local government officials in a number of local areas have been eager to complete consolidation in rural areas within their appointed terms to boost their performance and achievements. Second, it is advantageous that consolidation relates to demand; thus, urbanisation is a result of, rather than a prerequisite for, development. For this reason, farmers should be encouraged to move to non-agricultural sectors and/or urban areas, and the government should establish a social security system for rural residents to increase their employment opportunities in non-agricultural sectors. Only under these circumstances will social security be seen as a fair substitute for land security. By so doing, farmers' interests will be guaranteed rather passively lost without full compensation. It is a challenge for China to find appropriate ways to solve problems arising from further urbanisation.

Establishing New Systems of Community Management for Social Stability

To strengthen the rural community management system, organisations supporting farmers should be strengthened. The major tasks of rural community management include: to strengthen the cohesion of rural communities, promote the development of rural communities, and mediate conflicts in order to maintain the stability of rural communities. It is also important to build channels of communication between farmers and different levels of government, so that the needs and interests of the rural sector can be addressed democratically. In order to promote the democratic management of rural communities, the government must accept the supervision of farmers' organisations, and there must be systems to facilitate participation and influence from the rural sector. The first step is to improve the system of 'one project one discussion' that dominates public affairs and public finances at the village level, and improve the method of providing rewards and subsidies to farmers in order to promote public welfare at the village level. The participation of farmers (or their organisations) in public affairs will change the way that government functions in local communities and will have a direct effect on improving farmers' welfare. The challenge for governments is to transform current management techniques by empowering farmers' collective actions.

Conclusion

In short, the issues relating to farmers, agriculture, and rural areas are the weak links on the chain of China's economic development. It is crucial to resolve these issues in order to promote the development of the national economy. Rural China is undergoing rapid economic and social changes, which have impacted on the ways in which farmers, traditional communities and governments operate. To confront these challenges, it is important for government policies to complement market mechanisms in facilitating the ongoing process of urbanisation, and creating more employment opportunities for both migrant workers and farmers, while maintaining rural social stability at time of rapid social change. It is also important for the government to adopt measures that conform to or respect farmers' own choices through developing a more democratic local governance system.

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