Ph.D. Thesis (2012)

平成２３年度 博士論文

Sustainability of China's Grain Self-sufficiency

（中国における穀物自給の持続可能性）

Laboratory of International Environmental Economics

Department of Global Agricultural Sciences

Graduate School of Agricultural and Life Sciences

THE UNIVERSITY OF TOKYO

東京大学　大学院農学生命科学研究科

農学国際専攻 国際環境経済学研究室

Hui JIANG

姜　薈

March 2012

Table of Contents

List of Tables

List of Figures

Chapter 1 Background

1.1 Introduction

1.1.1 Doubts: Who will feed China?

Over the last three decades, China has achieved drastic economic growth and realized remarkable increase in incomes and an improvement in living standards; this has strongly influenced the country's diet. The Chinese tend to consume more meat, dairy products, and seafood for proteins rather than starchy foods such as cereals. China's grain markets are projected to experience a sustained increase in demand driven by population growth, rapid urbanization, rising income levels and the expansion of the livestock sector as a consequence of burgeoning meat consumption.

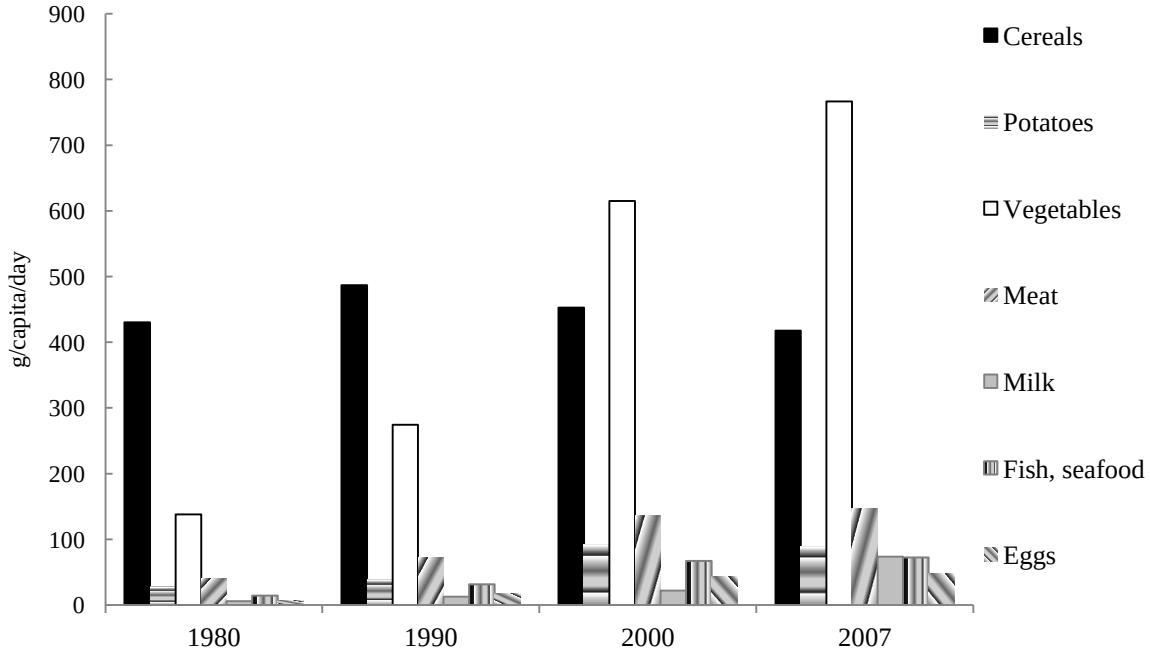

Figure 1.1 Changes in the per capita daily supply of six food items in China, 1980–2007

Note: Meat refers to the total meat products available for consumption, which is composed of bovine meat, pig meat, poultry meat, mutton & goat meat, and other meat products.

Source: FAOSTAT.

Figure 1.1 shows that, according to FAOSTAT, from 1980 to 2007, the per capita daily supply of cereals in China increased from about 430 grams to 521 grams and then declined gradually, almost reaching the level of 1980. At the same time, China's consumption of non-starchy food increased sharply. For instance, the total meat consumption more than doubled, while the consumption of aquatic and dairy products increased over four times and 11 times, respectively, during the same period.

Specific to various meat products, the increasing consumptions are the common trends for beef, pork, mutton and poultry (Figure 1.2). Consumption of pork, dominant in the total consumption of meat products, increased from about 30 grams per day to almost 100 grams and then decline to about 90 grams. The second largely consumed meat product is poultry meat, which grew from about 5 grams to 30 grams per day. By contrast, beef and mutton have been consumed at much lower levels until recently in spite of its increasing more than 11 times and five times during these 30 years.

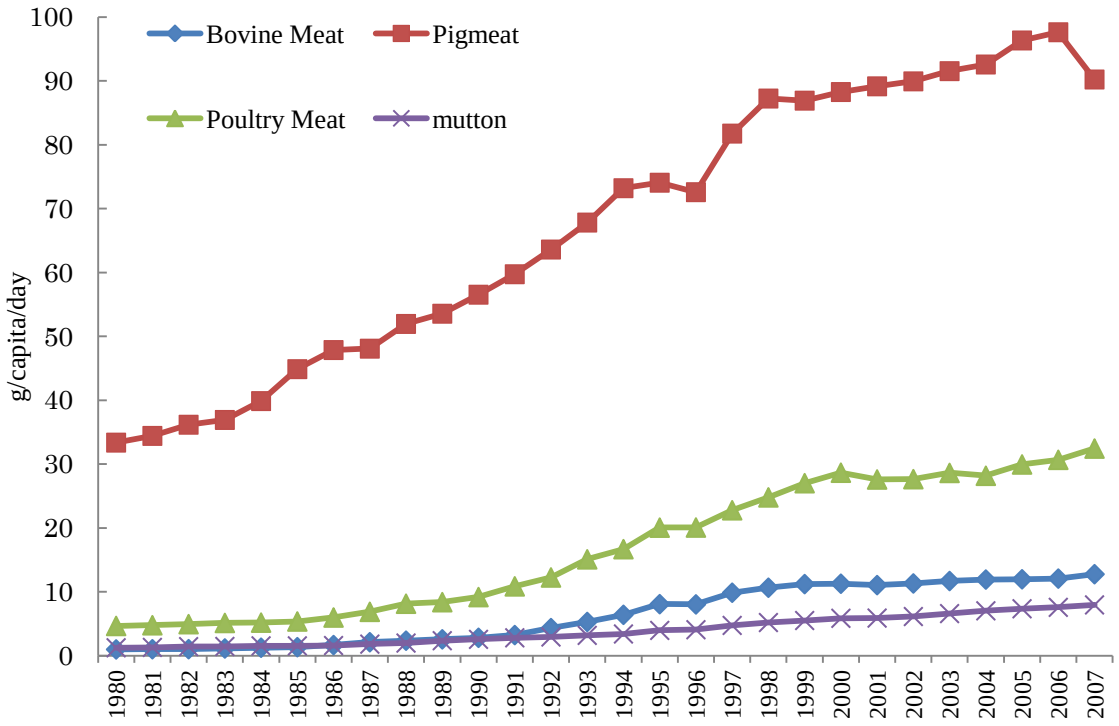

Figure 1.2 Changes in the per capita daily supply of various meat products, 1980-2007

Source: FAOSTAT.

These advanced dietary changes, particularly the increasing demand for livestock products, give

rise to concerns about "who will feed China" (Brown, 1995), since some economists insist that China will follow Western dietary patterns by consuming large quantities of meat and dairy products as their main sources of protein. According to Lester Brown, due to the rapid growth in livestock consumption on the demand side, and the lack of irrigating water and the decrease of arable land on the supply side, China would have to increase sharply its grain imports. The country's grain import needs by the year 2030 would range from a low 207 million tonnes to a high 369 million tones: the former was estimated based on no per capita consumption increase, while the latter was projected by expecting China's per capita grain consumption should increase to 110kg; this would lead to a shortage of grains worldwide.

Despite several important drawbacks in Brown's analysis, the book still evoked widespread and intense discussions. His pessimistic projections, though seldom scientific, stimulated economists and even China government itself to reconsider the grain problems in China. Enormous projections on China's grain imports came out with a variety of results due to their different assumptions, data sources and model structures. However, a consensus could be found in all these studies that China would play a crucial role in the global grain market.

As the world's most populous country with 1.3 billion people, China has great influences on the global supply-demand balance since it accounts for about 20% of global grain production and consumption. The country's domestic consumption is overwhelmingly larger than the world's grain trade volume. In recent years, the total world trade volume with regard to cereals has amounted to about 250 million tonnes, equal to merely 65% of China's domestic consumption. Compared with the world trade volume of 25 million tonnes per year with regard to rice, China's domestic rice consumption is over five times the total trade volume. China's grain self-sufficiency is not only an issue for the country but also has an important influence on global grain security.

1.1.2 Present situation

The grain self-sufficiency refers to the extent to which the grains demand can be satisfied by its supply for a country or a region. Generally, it is measured by the ratio of the grain production to the consumption demand in a country (region), and has been one of the important indices to evaluate the level of food security.

Although it has been acknowledged by economists that China will encounter great difficulty in further increasing agricultural production as the comparative advantage continues to decline inevitably with its economic development, the capacity of China to meet its grain requirement with its own production remains an important item on the agenda of policy makers. The

motivations for this objective, as Felloni, Gilbert, et.al (2003) pointed out, include protecting China from fluctuations in grain prices in world markets, avoiding a shortage of foreign currency, protecting farm incomes to counterbalance the rising inequality between rural and urban households and preventing the social unrest that might result from increased dependence on foreign staple commodities and increased income inequality, in addition to national pride and food security issues.

Table 1.1 Actual situation and policy goals in maintaining grain security

Item	Index	2007 (actual)	2010	2020
Production	Arable land area (100 million mu)	18.26	⩾18.00	⩾18.00
	:For grain	11.2	>11.00	>11.00
	Sown area (100 million mu)	15.86	15.8	15.8
	: For cereals	12.88	12.7	12.6
	Yield (kg/mu)	316.2	325	350
	Grain production (million tonnes)	501.6	⩾500	>540
	: Cereals	456.3	⩾450	>475
	Total meat production (10,000 tonnes)	6800	7140	7800
	Poultry and egg production (10,000 tonnes)	2526	2590	2800
	Milk production (10,000 tonnes)	3509	4410	6700
Supply -demand	Percentage of domestic grain production in grain consumption (%)	98	⩾95	⩾95
	: Cereals	106	100	100

Note: Mu is a commonly used unit for measuring land areas in China. 1mu = 666.67m^2, 1 ha = 15 mu.

Source: China National Development and Reform Commission (CNDRC) (2008), National grain security program framework for the medium and long term, Chinese. (http://www.gov.cn/jrzg/2008-11/13/content_1148414.htm)

In 1996, the Chinese government set their declared grain self-sufficiency goal in a long term plan at 95%, meaning that domestic production of grains should meet at least 95% of domestic demand. Table 1.1 shows that in 2007, domestic grain production met 98% of grain consumption and a high degree of self-sufficiency was achieved. Until recently in 2008, the Chinese government worked out a program framework of national grain security for the medium and long term, covering the period from 2008 to 2020. In this program, as Table 1.1 shows, the grain self-sufficiency ratio was aimed to keep at over 95%, and to realize the goal, the grain production was expected to reach at least 500 million tonnes in 2010 and increase to 540 million tonnes at a minimum by the year 2020. Among the three most important cereals, rice and wheat are expected

to be completely self-sufficient while corn is expected to keep fundamental self-sufficiency (China National Development and Reform Commission (CNDRC), 2008).

Table 1.2 Self-sufficiency situations for corn in China

Year	Area harvested (1000 HA)	Production (1000 MT)	Yield (MT/HA)	Imports (1000 MT)	Domestic consumption (1000 MT)	Self-sufficiency Rate (%)
1980/1981	20,353	62,600	3.08	772	61,800	101.29
1985/1986	17,694	63,826	3.61	374	59,700	106.91
1990/1991	21,402	96,820	4.52	0	79,850	121.25
1991/1992	21,574	98,770	4.58	0	83,200	118.71
1992/1993	21,040	95,380	4.53	0	87,800	108.63
1993/1994	20,690	102,700	4.96	0	92,900	110.55
1994/1995	21,152	99,280	4.69	4,287	97,000	102.35
1995/1996	22,767	112,000	4.92	1,476	101,200	110.67
1996/1997	24,498	127,470	5.20	75	105,750	120.54
1997/1998	23,775	104,309	4.39	287	109,500	95.26
1998/1999	25,239	132,954	5.27	262	113,920	116.71
1999/2000	25,904	128,086	4.94	71	117,300	109.20
2000/2001	23,056	106,000	4.60	89	120,240	88.16
2001/2002	24,282	114,088	4.70	39	123,100	92.68
2002/2003	24,634	121,300	4.92	29	125,900	96.35
2003/2004	24,068	115,830	4.81	2	128,400	90.21
2004/2005	25,446	130,290	5.12	2	131,000	99.46
2005/2006	26,358	139,365	5.29	62	137,000	101.73
2006/2007	28,463	151,600	5.33	16	145,000	104.55
2007/2008	29,478	152,300	5.17	41	150,000	101.53
2008/2009	29,864	165,914	5.56	47	153,000	108.44
2009/2010	31,180	163,974	5.26	1,296	165,000	99.38
2010/2011	32,500	177,245	5.45	979	176,000	100.71
2011/2012	33,200	184,500	5.56	3,000	189,000	97.62

Note: 1) 1 MT=1 merit tonne =1000 kg

2) The year listed is the first year of China's marketing year. (e.g. Year 2011 refers to 2011/2012, 10/2011-09/2012)

Source: USDA Foreign Agricultural Service, Production, Supply and Distribution Online database.

(http://www.fas.usda.gov/psdonline/psdHome.aspx)

When self-sufficiency rates of grain items are inspected, it can be found there exist discrepancies among the various items. Table 1.2, Table 1.3 and Table 1.4 show the specific supply-demand relationships of three major cereals, corn, wheat and rice.

As Table 1.2 shows, with the demand for feed grain increases, the harvested area of and production of corn tends to grow continually since the 1980s. Except for the several years in the early 2000s, China's corn production meets almost 100% of its domestic consumption.

In comparison with corn, the planting area of wheat has shown declining tendency over the past 30 years (Table 1.3). Compared with the largest number in 1991, area harvested in 2012 is projected to drop nearly 20% to 24.4 million hectares; this is closely related to the decreasing per capita demand of food wheat. Despite the decline in harvested area, the self-sufficiency rate of wheat, has been kept stable at about 105% since the late 2000s.

Similar to the situation of wheat, rice also shows declining tendency in harvest area (as is shown in Table 1.4). Rice production has been maintained at the almost same level over the last 15 years; this is mainly because the overall consumption demand for rice remains relatively stable in spite of the newly added population of more than 100 million at the same period. In other words, per capita rice consumption declines. As a consequence, almost 100 per cent of the rice consumption has been met by China's domestic production except in the early 2000s.

Table 1.3 Self-sufficiency situations for wheat in China

Year	Area harvested (1000 HA)	Production (1000 MT)	Yield (MT/HA)	Imports (1000 MT)	Domestic consumption (1000 MT)	Self-sufficiency Rate (%)
1980/1981	29,228	55,210	1.89	13,789	75,999	72.65
1985/1986	29,218	85,810	2.94	6,600	95,155	90.18
1990/1991	30,753	98,229	3.19	9,409	102,598	95.74
1991/1992	30,948	96,000	3.10	15,863	105,429	91.06
1992/1993	30,500	101,590	3.33	6,728	104,281	97.42
1993/1994	30,240	106,390	3.52	4,320	105,343	100.99
1994/1995	28,981	99,300	3.43	10,256	105,355	94.25
1995/1996	28,860	102,215	3.54	12,531	106,499	95.98
1996/1997	29,610	110,570	3.73	2,705	107,615	102.75
1997/1998	30,057	123,289	4.10	1,916	109,056	113.05
1998/1999	29,774	109,726	3.69	829	108,250	101.36
1999/2000	28,855	113,880	3.95	1,010	109,340	104.15
2000/2001	26,650	99,640	3.74	195	110,278	90.35
2001/2002	24,640	93,873	3.81	1,092	108,742	86.33
2002/2003	23,910	90,290	3.78	418	105,200	85.83
2003/2004	22,000	86,490	3.93	3,749	104,500	82.77
2004/2005	21,626	91,952	4.25	6,747	102,000	90.15
2005/2006	22,793	97,445	4.28	1,129	101,500	96.00
2006/2007	23,613	108,466	4.59	388	102,000	106.34
2007/2008	23,721	109,298	4.61	49	106,000	103.11
2008/2009	23,617	112,464	4.76	481	105,500	106.60
2009/2010	24,290	115,120	4.74	1,394	107,000	107.59
2010/2011	24,320	115,180	4.74	927	109,500	105.19
2011/2012	24,400	117,000	4.80	1,500	113,000	103.54

Note: 1) 1 MT=1 merit tonne =1000 kg

2) The year listed is the first year of China's marketing year. (e.g. Year 2011 refers to 2011/2012, 07/2011-06/2012)

Source: USDA Foreign Agricultural Service, Production, Supply and Distribution Online database.

(http://www.fas.usda.gov/psdonline/psdHome.aspx)

Table 1.4 Self-sufficiency situations for rice (milled) in China

Year	Area Harvested (1000 HA)	Yield (Rough) (MT/HA)	Milled Production (1000 MT)	TY Imports (1000 MT)	Consumption and Residual (1000 MT)	Self-sufficiency Rate (%)
1980/1981	33,878	4.13	97,934	162	98,587	99.34
1985/1986	32,070	5.26	117,999	352	111,894	105.46
1990/1991	33,064	5.73	132,532	68	123,911	106.96
1991/1992	32,590	5.64	128,667	93	126,827	101.45
1992/1993	32,090	5.80	130,354	212	128,135	101.73
1993/1994	30,360	5.85	124,390	968	129,340	96.17
1994/1995	30,171	5.83	123,151	1,998	130,117	94.65
1995/1996	30,745	6.02	129,650	852	131,237	98.79
1996/1997	31,406	6.21	136,570	322	131,954	103.50
1997/1998	31,765	6.32	140,490	261	132,700	105.87
1998/1999	31,214	6.37	139,100	178	134,100	103.73
1999/2000	31,284	6.34	138,936	278	134,200	103.53
2000/2001	29,962	6.27	131,536	270	134,300	97.94
2001/2002	28,812	6.16	124,306	304	136,500	91.07
2002/2003	28,200	6.19	122,180	258	135,700	90.04
2003/2004	26,508	6.06	112,462	1,122	132,100	85.13
2004/2005	28,379	6.31	125,363	609	130,300	96.21
2005/2006	28,847	6.26	126,414	654	128,000	98.76
2006/2007	28,938	6.28	127,200	472	127,200	100.00
2007/2008	28,919	6.43	130,224	295	127,450	102.18
2008/2009	29,240	6.56	134,330	337	133,000	101.00
2009/2010	29,627	6.59	136,570	366	134,320	101.68
2010/2011	29,820	6.56	137,000	600	135,000	101.48
2011/2012	29,940	6.70	140,500	400	138,500	101.44

Note: 1) 1 MT=1 merit tonne =1000 kg

2) The year listed here is the first year of China's marketing year. For the years before 2006, the first year refers to the calendar year (e.g. Year 2006 refers to 2006/2007, 01/2007-12/2007). For the years since 2007, the first year refers to the marketing year beginning from July to June the next year. (e.g. Year 2011 refers to 2011/2012, 07/2011-06/2012)

Source: USDA Foreign Agricultural Service, Production, Supply and Distribution Online database. (http://www.fas.usda.gov/psdonline/psdHome.aspx)

1.1.3 Emphasis in grain self-sufficiency: demand of feed grain

According to the FAO, grain generally refers to the cereals, which include rice, wheat and coarse grains. Coarse grains, of which corn accounts for the primary proportion, include sorghum, millet, barley, oats, rye, mixed grains, etc.

In China, grain is defined in a narrow sense and a broad sense respectively. Grain in a narrow sense refers to all cereals as FAO defined including rice, wheat, corn, sorghum, millet and other miscellaneous grains. Grain in a broad sense also includes tubers and beans in addition to cereals. The formation of the latter definition was closely related to the specific historical conditions. Since the People's Republic of China was founded in 1949, China has been faced with the severe problem of feeding its enormous population. Due to the shortfall of cereals, food in addition to cereals such as potatoes and sweet potatoes were also used for main food. Correspondingly, the beans and tubers were incorporated into grain in statistics. Since 1991, grain has been listed by three separate subgroups, namely, cereals, tubers and beans. However, grain output in official statistics still refers to the sum of output for these three subgroups with certain conversion ratios. Output of beans refers to dry beans without pods. The output of tubers (sweet potatoes and potatoes, not including taros and cassava) were converted into that of grain at the ratio 4:1, i.e. 4 kilograms of fresh tubers were equivalent to 1 kilogram of grain up to 1963. Since 1964 the ratio for conversion has been altered to 5:1. Tubers supplied as vegetables (such as potatoes) in cities and suburbs are calculated as fresh vegetables and their output is not included in the output of grain. Output of all other grains refers to husked grain. Data on grain production before 1989 were obtained through the Comprehensive Statistical Reporting System. Since 1989, data from sample surveys are used. In this paper, in order to make comparison with international data when discussing grain security, grain here refers to cereals, the narrow definition.

According to the utilization, the grain demand can be divided into four categories, i.e., food grain, feed grain, grain for industrial use and grain for seed. [1]

In China, food grain constitutes the top demand for grain accounting for more than half of the aggregate demand. However, the share continues to decline from the mid-1980s (Figure 1.3). This is consistent with the fact that the food grain consumption per capita began to decline after reaching the peak around 1984 and remained stable at the almost same level with 1980 shown in Figure 1.1.

[1] China National Bureau of Statistics (2010): China Statistical Yearbook, China Statistical Press, Beijing.

The second largest grain demand is from feed grain demand. Feed grain in China is composed mainly of coarse grains, plus a small share of rice in southern China and wheat in northern China. In comparison with food grain, the percentage of feed grain needed for livestock production shows an upward changing path. As Figure 1.3 shows, after a mild decrease in the early 1980s, feed grain continued to increase steadily to over 30% of the total grain demand. Moreover, given the trend towards diversification of diets, feed grain is likely to account for most of the growth in China's future aggregate grain demand. Therefore, this thesis attaches importance to the study of feed grain. Table 1.5 and 1.6 demonstrate two major feed grains in China, corn and wheat. Of all the corn consumption, feed use accounts for about 70%. As the major feed grain, domestic consumption of feed corn has kept increasing year on year over the last three decades and accounts for nearly 90% of the overall feed grains. In contrast, wheat constitutes about 10% of the feed grains, and only 10-15% of wheat is used for feed.

In addition, grain for industrial use, including the production of alcohol, cakes, seasonings, medicines, textiles etc., also sees a continual increase accounting for about 13% of total demand in 2007 from about 8% level in 1980.

Finally, determined by sown area, technological improvement and crop composition, grain for seed use is relatively small in the quantity accounting for merely 2.6 percent of the total grain demand, and had been comparatively stable over the last 30 years compared with the previous three categories.

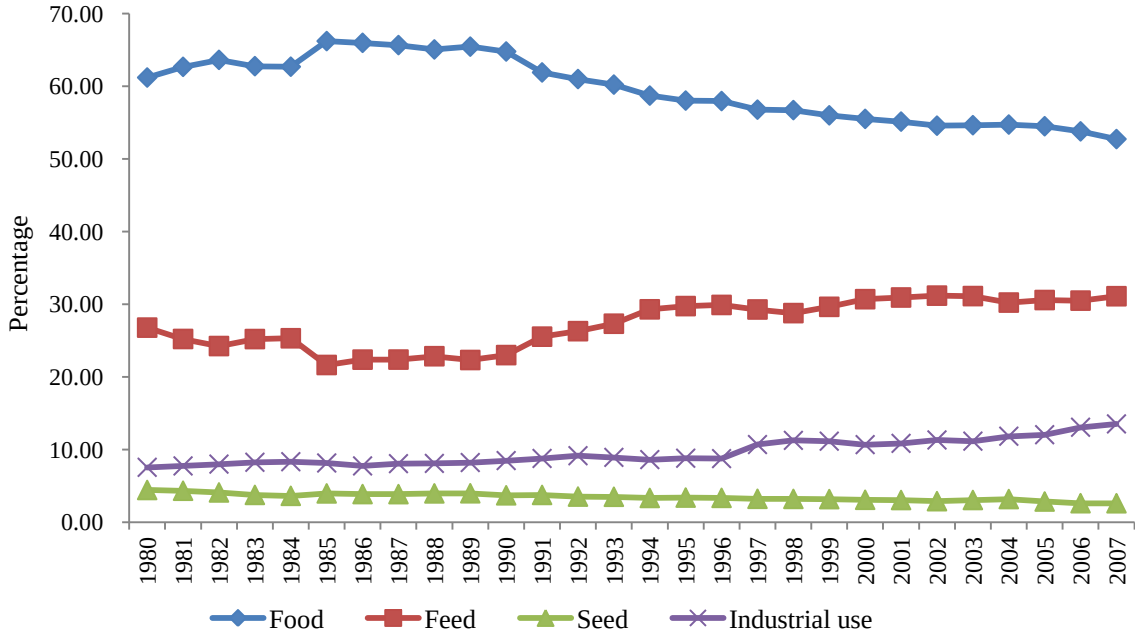

Figure 1.3 Composition of grain demand in China, 1980-2007

Source: FAOSTAT

Compared with the declination in the share of food grain and the relatively stable proportion of seed grain, grains for feed and industrial use are increasing continuously during the last 30 years. Particularly, feed grain should be attached importance to given its large share in the aggregate demand and its speed of growth. In the following chapters, feed grain is the emphasis of research.

Table 1.5 Corn for feed use in total domestic consumption

Year	Feed Domestic. Consumption (1000 MT)	Domestic Consumption (1000 MT)	Percentage of feed consumption
1980/1981	27,100	61,800	43.85
1985/1986	37,200	59,700	62.31
1990/1991	53,350	79,850	66.81
1991/1992	56,500	83,200	67.91
1992/1993	61,000	87,800	69.48
1993/1994	66,000	92,900	71.04
1994/1995	71,000	97,000	73.20
1995/1996	75,000	101,200	74.11
1996/1997	79,000	105,750	74.70
1997/1998	82,500	109,500	75.34
1998/1999	86,500	113,920	75.93
1999/2000	89,500	117,300	76.30
2000/2001	92,000	120,240	76.51
2001/2002	94,000	123,100	76.36
2002/2003	96,000	125,900	76.25
2003/2004	97,000	128,400	75.55
2004/2005	98,000	131,000	74.81
2005/2006	101,000	137,000	73.72
2006/2007	104,000	145,000	71.72
2007/2008	106,000	150,000	70.67
2008/2009	108,000	153,000	70.59
2009/2010	118,000	165,000	71.52
2010/2011	124,000	176,000	70.45
2011/2012	132,000	189,000	69.84

Source: USDA Foreign Agricultural Service, Production, Supply and Distribution Online database. (http://www.fas.usda.gov/psdonline/psdHome.aspx)

Table 1.6 Wheat for feed use in total domestic consumption

Year	Feed Domestic Consumption (1000 MT)	Domestic Consumption (1000MT)	Percentage of feed consumption
1980/1981	1,600	75,999	2.11
1985/1986	2,300	95,155	2.42
1990/1991	2,700	102,598	2.63
1991/1992	5,000	105,429	4.74
1992/1993	2,750	104,281	2.64
1993/1994	2,700	105,343	2.56
1994/1995	3,000	105,355	2.85
1995/1996	3,200	106,499	3.00
1996/1997	3,400	107,615	3.16
1997/1998	4,900	109,056	4.49
1998/1999	5,000	108,250	4.62
1999/2000	6,500	109,340	5.94
2000/2001	10,000	110,278	9.07
2001/2002	9,000	108,742	8.28
2002/2003	6,500	105,200	6.18
2003/2004	6,000	104,500	5.74
2004/2005	4,000	102,000	3.92
2005/2006	3,500	101,500	3.45
2006/2007	4,000	102,000	3.92
2007/2008	8,000	106,000	7.55
2008/2009	8,000	105,500	7.58
2009/2010	10,000	107,000	9.35
2010/2011	13,000	109,500	11.87
2011/2012	17,000	113,000	15.04

Source: USDA Foreign Agricultural Service, Production, Supply and Distribution Online database.
(http://www.fas.usda.gov/psdonline/psdHome.aspx)

1.2 Previous studies

Since 1950s, China had been paying more attention to produce enough grain to feed its rapidly increasing population until the 1980s. The demand of feed grain accounted for a comparatively small proportion in the total demand. With a rapid economic growth and a substantial increase in income from the 1980s, Chinese people tended to consume more livestock products, stimulating the demand of feed grain. On the other hand, good harvests supplied more grains available to feed. The problem of feed grain began to come out and draw attention of many economists.

The CAAS (1985) and Liu (1988) are among the first to give attention to the role of feed grain and the development of China's animal industries. After them, many projections (CAAS, 1989; Cheng, et al., 1997; Guo, Huang, et al., 2001; Huang and Rozelle, 1998; Garnaut and Ma, 1992; Chen, 2004) are made aiming at projecting the demand and supply of feed grain in China, which vary a lot particularly in the demand projections due to differences in the data quality, the value of feed-meat conversion ratios (CAAS, 1989; Cheng, et al., 1997; Guo, Huang, et al., 2001), and the estimations in income elasticity for animal products. Zhou, Tian and Malcolm (2008) try to explore the reasons why the projections differ on supply and demand of feed grains, and seek to identify ways (the most two important ones: estimating income elasticity by using recent data, estimating feed-meat conversion ratios for different production systems) to improve projections after summarizing past forecasts. However, they only provide a summary about some previous studies instead of making actual improvements with empirical researches.

In the previous studies relevant to the demand side, some earlier previous studies before 1990s (Chow, 1984; Van de Gaag, 1984; Lewis and Andrews, 1989) mainly use a linear expenditure system (LES) to estimate expenditure elasticities in China, and most of them suffer from the small number of available observations, which limits their applicability. From 1990s, estimations with AIDS (almost ideal demand system) (Alston, Foster, et al., 1994) became a popular method for estimating price and expenditure elasticities. Estimations on urban China or rural China, as a whole or at a province level, are carried out using this method (Halbrendt, Tuan, et al., 1994; Fan, Cramer, et al., 1994; Fan, Wailes, et al., 1995; Wu, Li, et al., 1995). Shen (2007) estimates both urban and rural demand system with the method of LA/AIDS, but he uses combined cross sectional (income group data in urban areas and provincial data in rural areas) and time series data during 1985-1994 and 1985-1998 for urban and rural China respectively, which limits its applicability to reflect the most recent situation.

1.3 Framework and originalities

This thesis seeks to provide an analysis, from both the demand and supply sides, of whether China can achieve the sustainable self-sufficiency in grains—particularly for feed grains—in the near future. However, the aim of this research is not to project directly how much China's grain self-sufficiency rate will be in the future; instead, it aims to investigate the self-sufficiency problem by simulating possible impacts of China's increasing grain demand on the world price.

Chapter 1 gives backgrounds for this study from both theoretical and practical perspectives. Despite several important drawbacks in his analysis, Lester Brown's book has evoked widespread and intense discussions, and stimulated economists and even the Chinese government itself to reconsider the grain problems in China. Reflected in China's grain policy, the Chinese government set their declared grain self-sufficiency goal at 95% in the two long-term plans in 1996 and 2008. According to official statistics, domestic grain production met 98% of grain consumption up to 2007, and the self-sufficiency rate of cereals as a whole amounted to 106%; in other words, a high degree of self-sufficiency was achieved.

In spite of this, China's grain problems are still faced with challenges and pressures. Although directly consumed food grains account for more than 50% of China's total grain demand, the proportion has been continually declining since the mid-1980s. In contrast, demand for feed grains has been growing to more than 30% of the overall grain demand in the 2000s and is projected to keep increasing due to the burgeoning livestock demand in the years ahead. China's grain self-sufficiency problem, in this sense, is essentially a problem of feed grains. Therefore, demand for livestock products need to be researched in detail in order to analyze the feed grain issue. This, in combination with an analysis of the supply side, shall contribute to the design of a supply-demand model of grains that can estimate the level of influence China has on global grain security. Previous studies in this field are reviewed, and methods, objectives and originalities in this study are clarified. The framework of this thesis is also introduced.

Chapter 2 provides an overall analysis on the changing direction of China's dietary pattern. By making principal component analysis (PCA) on food consumption data from 174 countries, it finds that China has been progressing for advanced diets by consuming less staple food and more meat, aquatic and dairy products for proteins. However, results of the PCA also show that China is not following the Western pattern of diet highly dependent on meats and dairy products such as the US and UK, but is moving towards the dietary pattern of East Asia's developed countries (regions) by consuming more fish and seafood like Japan, South Korea, Taiwan and Hong Kong; This finding is

important because it poses the possibility of much less meat consumption contrary to some economists' assumptions.

In chapter 3, characteristics of China's food consumption are investigated in both urban and rural areas based on estimations of expenditure elasticities. As is well known, urban-rural gaps are significant in China. Clear distinctions exist between urban and rural diets owing to differences in income levels, developmental stages, and lifestyles. It is essential to incorporate both urban and rural China into the analyses in order to have a complete and precise understanding of China's feed grain demand. In this chapter, the expenditure elasticities in both urban and rural areas are estimated through two methods, namely the double logarithmic function (DLF) analysis and the LA/AIDS (linear approximate almost ideal demand system) analysis.

Many results are common across the DLF and the LA/AIDS analyses. First, expenditure elasticities of most food items tend to decline in both urban and rural areas as the income increases. Second, the urban-rural gaps exist in food consumption, likely due to differences in the speed of economic growth and income level. On the whole, the expenditure elasticity is higher in rural China than in urban China for the same item. Third, similar dietary patterns and preferences are found between urban and rural areas. Estimations show that the Chinese people tend to consume more aquatic products than meats and poultry when their income increases; this pattern is different from the Western experience. Among meats and poultry, poultry is much more income elastic than pork, beef, or mutton. Moreover, among the livestock products, although the expenditure elasticities of beef and mutton are higher than that of pork, the expenditure share of pork is significantly larger than those of beef and mutton.

These results can be explained by China's dietary characteristics. Despite the influences China has felt from the Western diets over the last three decades that have led to higher consumption of milk and beef, the Chinese still regard aquatic products as premium foods, believe in the nutrient value of poultry, and retain pork as their predominant meat product. Compared with beef, the provision of aquatic products, poultry, and pork requires far fewer feed grains; this means that the increase in feed grains may be mild and thus leads to less stress on China's feed grain balance than the OECD projected.

Chapter 4 seeks to develop a supply-demand model of feed grains. To determine the demographic assumptions in the model related to population changes, previous studies in this field, including analyses of historical changes and projections for the future changes, are reviewed in detail.

Then in order to decide the assumptions concerning China's domestic supply capacity in the

supply-demand model, detailed reviews of previous studies in this field are performed. In addition, original estimations are carried out in which area of arable land and yield are both taken into consideration.

Finally, a supply-demand model is built in the latter half of chapter 4. Three scenarios are developed by assuming different expenditure elasticities for beef and pork consumption: the expenditure elasticities for urban and rural China estimated in chapter 3, and another the OECD estimated and used to make projections of China's grain demand in the AGLINK-COSIMO model. The simulation results show significantly different projections among these three scenarios. Compared with the scenario using the OECD expenditure elasticities, projections with the estimated expenditure elasticities for both urban and rural China in the present study yield a less rapid increase in China's feed grain demand and thus price of grains. According to this analysis, China is expected to sustain its demand for grains without jeopardizing world grain's supply-demand balance and leading to a global price boom. In conclusion, policy proposals are made in order to assist sustainable grain self-sufficiency in China.

Finally in chapter 5, two major conclusions of the whole thesis are summarized. First, China is not following and will not follow the Western dietary pattern as income increases. Second, the future increase in China's grain demand is expected to be manageable without breaking the world's grain supply-demand balance and leading to a price boom. In this sense, China is predicted to be able to achieve a sustainable self-sufficiency in grains in the near future. However, attention should be paid to several assumptions based on which these conclusions are arrived at.

As far as the originalities are concerned, this study differs from previous studies in the following ways: 1) it gives an overall analysis on the changing direction of China's dietary pattern until the late 2000s; 2) it uses the latest data representing a longer time period (1995–2007) to estimate the expenditure elasticities of different food items by both the DLF and LA/AIDS analyses, which lead to a comparatively high applicability of estimation results; 3) it incorporates both the urban and rural areas into the research to identify the differences and commonalities between urban and rural China; and 4) it concludes that in all likelihood the OECD may have overestimated China's feed grain demand by simulations using the estimates of expenditure elasticities in this study and the OECD ones in an original supply-demand model.

Chapter 2 Dietary pattern in China: changes and tendencies

As mentioned in the previous chapter, China has been undergoing substantial changes for advanced diets. Consumption of meat, dairy and aquatic products increases greatly, whereas directly consumed food cereals see a continuous decrease. Thus it is taken for granted by some that China is following the Western diet, which is seldom supported even by the current evidence. In this chapter, food consumption patterns are analyzed using the method of principal component analysis (PCA), and it is found that with economic growth the Chinese show preference for fish and seafood, which is very similar to other East Asian countries (or regions) rather than large quantities of consumption of livestock products typical in the Western countries.

2.1 Varied types of dietary patterns

Table 2.1 provides a comparison of food consumption by country (region) mainly in 2007. Eight countries (regions) in five areas are presented here of per capita daily supply for various food items. These areas show obvious distinctions in consumption of cereals, meat, aquatic and dairy products.

On the whole, Africa is characteristic of a relatively large consumption of cereals amounting to 396.38 grams per capita per day and small intakes of proteins from both meat and aquatic products; this indicates a dietary pattern in comparatively underdeveloped areas dependent on starchy food and lacking intakes of protein. On the contrary, either Eastern Asia or European and American area demonstrate much higher intakes from meat and aquatic products. However, compared with Europe and Northern America, Eastern Asia consumes significantly lesser meat (particularly bovine meat) and milk while comparatively large quantities of vegetables, fish and seafood on the whole.

Specific to China, the daily available consumption of cereals is still at a high level, which is significantly more than that in European and American countries such as France, the UK and US but also the other countries or regions within Eastern Asia.

Meat consumption in China, close to the average level of Eastern Asia with 146 grams per capita per day, is merely 2/3 of the Europe average and much less than 1/2 of the American level. This

consumption gap is particularly true in the case of bovine meat. The UK and France consume about five times of beef compared with China, and the gap is nearly 10 times between the US and China. Therefore, it seems hard to imagine an increase in China's beef consumption of five to ten times in the near future especially when it's found that even the Eastern Asia country with the largest beef consumption only consumes 30.76 grams, not enough to 1/2 of the European level and about 1/4 of the US consumption. As to consumption of pork, there are not significant differences between China and the European and American countries. In consumption of poultry, although the gap is not as large as the bovine case, the consumption in China accounts for about 1/2 and 1/4 of the Europe and the US level, respectively.

Table 2.1 Per capita daily supply of food items among various countries (regions), 2007

Unit:g/capita/day

Country/Region	Cereals	Potatoes	Vegetables	Meat	Bovine meat	Pig meat	Poultry meat	Fish, Seafood	Eggs	Milk
Eastern Asia	407.89	85.96	714.71	143.41	14.13	85.93	33.29	81.77	47.01	76.56
China	417.71	89.13	766.83	146.43	12.78	90.23	32.45	72.49	47.69	73.46
Japan	315.34	62.03	290.91	126.39	23.54	54.97	46.98	166.53	53.67	132.57
Korea	389.28	28.94	584.63	153.01	30.76	85.31	36.00	144.27	28.33	31.27
Taiwan 2008	224.29	27.51	282.62	198.78	10.59	102.18	81.64	94.44	45.58	52.04
Hong Kong 2005-07	488.75	8.05	168.91	112.50	15.06	53.81	37.38	70.78	15.18	34.23
Europe	360.01	250.36	319.91	210.89	45.91	97.37	55.63	56.29	34.95	254.62
France	324.76	177.84	269.04	243.21	73.64	87.00	57.82	95.32	40.28	111.83
UK	310.42	291.94	251.57	234.28	60.14	76.15	79.61	55.75	28.14	326.56
Americas	331.36	100.02	224.85	233.95	84.64	47.65	96.65	40.30	30.62	280.04
Northern America	307.85	156.13	348.42	330.06	110.74	80.7	135.37	65.83	38.28	326.84
US	305.77	152.46	349.62	336.41	112.96	81.31	138.88	65.90	39.15	351.42
Africa	396.38	38.78	157.51	42.50	16.03	3.11	12.42	23.23	5.94	77.53

Source: FAOSTAT 2007, Council for Agriculture, Executive Yuan, Taiwan and Center for Food Safety of the Food and Environmental Hygiene Department, Hong Kong (2010).

The situation of fish and seafood is quite contrary to meat. Except France, China consumes more aquatic products than the European and American countries. This is consistent with the whole situation within Eastern Asia.

For dairy products, the circumstances are similar to meat products with much more consumption

in the European and the US than China. For a country that had not the dietary habit of drinking milk in the past, it is also hard to project that China will increase milk consumption to the Western level.

Of course it should not be taken for granted that countries (regions) in the same area will inevitably have the same dietary pattern. However, it is still reasonable to assume that two countries (regions) where based on the same culture, composed of the same ethnic groups, will probably follow a similar path in the course of dietary changes despite the gaps in development stages and speeds of economic growth. Typically, China mainland and Taiwan, are supposed to be such an example. In Table 2.1, it is shown that meat consumption in China Mainland is much less than that in Taiwan, among which differences in poultry meat consumption accounts for the primary gap while only minor differences exist for beef and pork consumption across these two regions. With respect to aquatic products, Taiwan is found to have more consumption than China Mainland. If the above assumption is right, there are possibilities that China shall be faced with an increase in consumptions of poultry and aquatic products, while demand for beef or pork shall not see a drastic growth.

The above Table 2.1 gives a glance at the comparison of diet among countries (regions). What we are mostly interested in is to clarify whether there are clear distinctions in dietary patterns between Eastern Asia and the West, and which path China has experienced in its dietary changes.

To this end, principal component analysis (PCA) provides a method to condense large quantities of dietary information into several new variables (principal components). Using cross-country (region) data, the PCA helps in showing the distribution of principal components for various countries (regions) and classifying these countries (regions) into different dietary patterns according to their distribution characteristics. Shono, Suzuki, and Kaiser (2000) made PCA using per capita daily supply data (obtained from FAOSTAT) from 127 countries during the period, 1992-1994 and found that upon to 1996, China's diets are moving towards the pattern of East-Asian developed country like Japan and Korea with preference for aquatic products rather than European and American pattern depending on meat and dairy products. Their research reflected the changing tendency until the mid-1990s of China's dietary pattern. However, it is still necessary to address the changing direction in the 21st century using the latest data.

In this chapter, a re-examination is provided of changes in dietary pattern in China, particularly of those after the mid-1990s by using PCA.

2.2 Principal Component Analysis (PCA)

PCA helps to summarize the most important information by converting n variables we have known into p (p<n) new variables, in other words, PCs representing the refined characteristics of observations. The mechanism of PCA can be described as follows:

$$PC_i = a_{i1}X_1 + a_{i2}X_2 + \ldots + a_{im}X_m = \sum_{j=1}^{m} a_{ij}X_j \qquad i=1,2,3, \ldots,m$$

Here, PC_i denotes the i_{th} Principal Component, X_j denotes the original variables (usually be standardized in advance), and aij satisfies the constraint below.

$$\sum_{j=1}^{m} a_{ij}^{2} = 1 \qquad i=1,2,3, \ldots,m$$

The coefficients a_{ij} are achieved in such a order that a_{1j} in PC_1 are first chosen to maximize the variance of PC_1, and in the next stage a_{2j} in PC_2 are chosen to maximize the variance of PC_2 likely, under the constraint that PC_2 is uncorrelated with PC_1, etc.. By this method, all the PCs can be generalized from the original variables (for detailed explanation of PCA, see Jolliffe, 1986). PC_i's contribution ratio, or the percentage of PC_i's variance in the total variance, can be worked out as:

$$\text{Contribution ratio of } PC_i = \frac{\mathrm{Var}(PCi)}{\sum \mathrm{Var}(Xj)} \times 100$$

To eliminate the influences due to the differences in absolute quantity of original variables in PC calculation, usually the original variables are standardized before working out the PCs, which means

$$\sum_{j=1}^{m} \mathrm{Var}(X_j) = m$$

Per capita daily supply data are mainly obtained from FAOSTAT. 6 food items, namely cereals, potatoes, vegetables, meat, milk and fish & seafood are selected for the research objects since they account for a large proportion in diets. First, per capita daily supply of these 6 food items for 174 countries in 2005 are used for the calculation of principal components (PCs). Then, the PC scores for additional observations of selected countries (or regions) in East Asia, North America, and

Europe (namely, China for the years 1970, 1980, 1990, 1995, 2000, 2007; Japan, South Korea, the US, the UK and France for the years 1970, 1980, 1990, 2000; Taiwan for the years 1985, 1990, 1995, 2000, 2005 and 2008[2]; Hong Kong during 2005-2007[3]) are calculated based on the coefficients of PCs [4]determined by consumption data for 174 countries in 2005. This procedure is taken so that the dataset used to compute the coefficients of PCs is unaffected by the inclusion of additional data, of which selection is arbitrary.

2.3 Results

As Table 2.2 shows, the cumulative contribution ratio by the third PC reaches about 78 percent, implying that PC_1, PC_2, and PC_3 can be used to represent the summarized characteristics of food demand for the observation countries. Definitions of these three PCs are made according to the relationships between per capita daily supply of various food items and PCs as presented in Table 2.3.

Table 2.2 Estimation results of the PCA

PC	Var(PCi)	Contribution proportion	Cumulative contribution
PC_1	2.298	0.383	0.383
PC_2	1.453	0.242	0.625
PC_3	0.897	0.150	0.775
PC_4	0.514	0.086	0.861
PC_5	0.462	0.077	0.938
PC_6	0.375	0.063	1.000

Source: calculated according to data of FAOSTAT.

[2] Source: Council of Agriculture, Taiwan, Food balance sheets, various years. (http://www.coa.gov.tw/agriculture_file/info_agri.htm)

[3] Source: Center for Food Safety of the Food and Environmental Hygiene Department, Hong Kong (2010) (http://www.cfs.gov.hk/english/programme/programme_firm/programme_fcs.html)

[4] See Appendix A for the detailed data.

PC_1 shows positive relationships with all the 6 food items, and has particularly strong positive relationship with potatoes, vegetables, meat and milk. Such characteristics implicate the extent of economic growth at the first stage leading to increases of demand for almost all food items especially potatoes, vegetables, meat and milk. Therefore, PC_1 is defined as "first-stage economic growth". PC_2 is highly positively related to consumptions of meat and fish & seafood, whereas is negatively related to cereals remarkably. The phenomena are usually seen in countries experiencing rapid economic growth where demand increases for high-protein food like meat, dairy and aquatic products and decreases for starchy food. Thus PC_2 is defined as "advanced diets". As to PC_3, it has strong positive relationship with consumption of cereals, vegetables and seafood, while is somewhat negatively related to potatoes, milk and meat. It is considered as the factor which distinguishes western dietary pattern depending on meat and milk as main sources of protein intakes, and East-Asian developed dietary pattern with preference for fish and more consciousness on health.

Table 2.3 Coefficients of PC_i (a_{ij})

Variable	PC_1	PC_2	PC_3
Cereals	0.160	-0.653	0.458
Potatoes	0.527	-0.042	-0.241
Vegetables	0.499	-0.152	0.446
Meat	0.442	0.440	-0.102
Milk	0.497	-0.076	-0.349
Fish, seafood	0.078	0.591	0.634

Source: calculated according to data of FAOSTAT.

According to the coefficients of three PCs, values of PC_1, PC_2, and PC_3 for observations are calculated. Scatter plot reflecting distributions for observation countries (or regions) between PC_1 and PC_3 is presented in Figure 2.1. In addition to the 2005 scatters for the 174 countries, China's PC distributions in 1970, 1980, 1990, 1995, 2000 and 2007, Taiwan's 2008 distribution and Hong Kong's distribution during 2005-2007 are also given in this figure. Consistent with the finding by Shono, Suzuki, and Kaiser (2000), China demonstrated increasing preference for fish and seafood from 1970 to the mid-1990s, which is very similar with other East Asian countries (or regions) such as Korea, Taiwan, Hong Kong, and Japan. Moreover, it is newly found in the present study that such an increasing preference for aquatic products still continues to date. In contrast, the US and UK typical of western countries display completely different distributions with East Asian countries (or regions) by depending on meat and milk as their main sources of proteins.

Another interesting finding is that even inside western countries, there are still differences. Compared with UK and the US, French consume more fish and seafood, which can be explained by the fact that more fish and seafood are used in French cuisine than in American and British ones.

Figure 2.2 shows the scatter of PC_2 and PC_3 for the observation countries (regions). As the arrow signs show, PC_2 experienced a decrease first until the 1980s and then began to increase significantly since the 1990s, while PC_3 has kept increasing from the 1970s till now. This changing path has the implications as follows:

Before the 1990s, China's diet tended to be much more dependent in the consumption of starchy food such as cereals. Since the early 1990s, the country has changed for advanced diet with increasing demand for high-protein food such as meat, milk and aquatic products from the 1990s. However, from 1970 to 2007, China shows continuously increasing preference for fish and seafood rather than meat and dairy products. The changing path of China after 1990 is quite similar to that of Korea during 1970-1985. Besides, China has much similar scores at PC_3 with the other Eastern Asian countries (regions), whereas is quite larger in PC_3 scores compared with the Western countries except France.

Apart from the analysis using the 2005 data, data in 1995 and 2000 are also used for PCA estimations. Similar tendencies are found in the results for the latter two years.[5]

2.4 Summary

Through re-examination of the recent changes in China's dietary pattern using PCA with food consumption data from 174 countries (regions), empirical evidence is provided for the conclusion that China is not following western diets. It is true that China has been changing for advanced diets, but instead of following diets of western countries, the country tends to consume more fish and seafood rather than meat and dairy products to obtain proteins like other East Asian developed countries (or regions) such as Japan, Korea, Taiwan and Hong Kong. This tendency continues well into the current century.

These results are explained well by realities and dietary characteristics in China, and moreover,

[5] For detailed analysis for the year 1995 and 2000, see appendix A.

have important implications for projections of China's grain demand in the years ahead in demonstrating possibilities of a relatively mild increase of feed grain demand and thus less stresses for China's grain balance since poultry and aquatic breeding cost less grain than beef and pork do.

Finally, China's dietary changes have been mainly analyzed in this chapter at nation levels while internal differences have not been touched on. China is so vast in territory that evident disparities exist among regions in income levels and dietary habits. Even in the same province, there are also great differences between urban and rural areas due to income gaps and different patterns of living. These regional and urban-rural disparities in China indicate that it is necessary to take these differences into consideration when analyzing changes in dietary patterns.

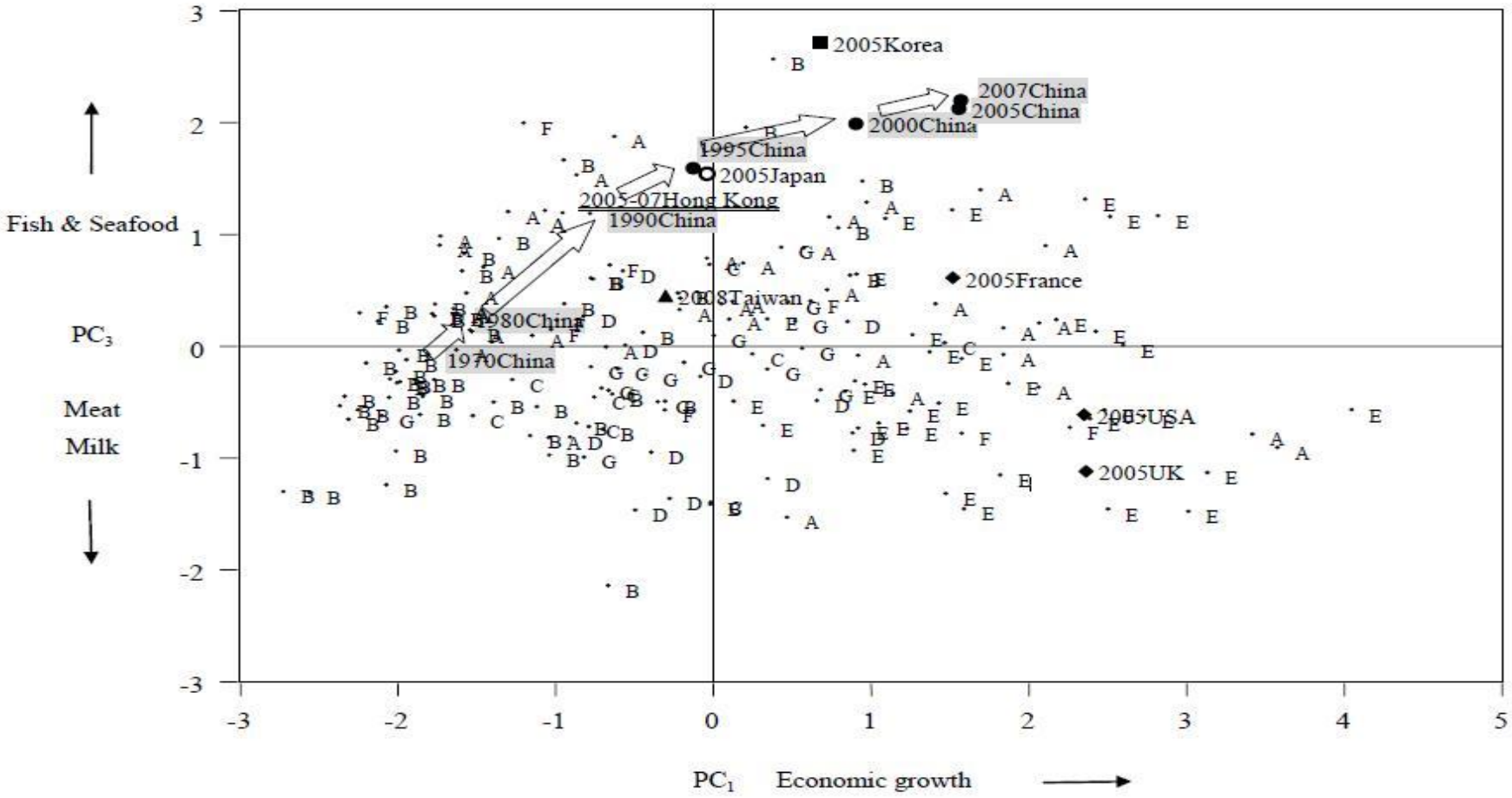

Figure 2.1 Scatter of PC_1 and PC_3

Source: FAOSTAT, Council of Agriculture, Taiwan and Center for Food Safety of the Food and Environmental Hygiene Department, Hong Kong (2010).

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania. The numbers before abbreviations of countries mean the year. For example, 2005China means the PC value pairs for China in 2005.

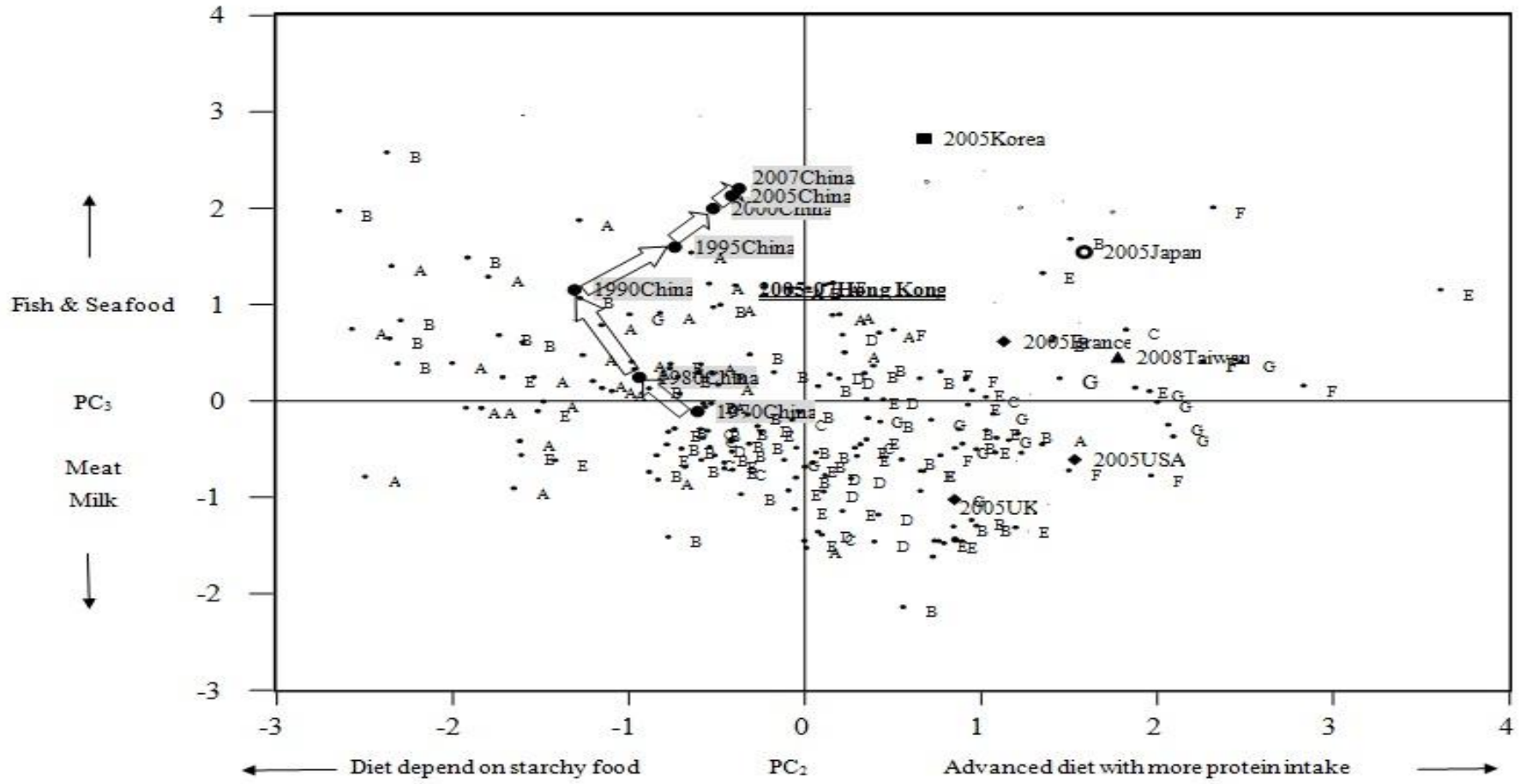

Figure 2.2 Scatter of PC_2 and PC_3

Source: FAOSTAT, Council of Agriculture, Taiwan and Center for Food Safety of the Food and Environmental Hygiene Department, Hong Kong (2010).

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania. The numbers before abbreviations of countries mean the year. For example, 2005China means the PC value pairs for China in 2005.

Chapter 3 Characteristics of food consumption for urban and rural China: findings in analyses of expenditure elasticities of demand

In the previous chapter, an analysis of China's feed grain demand is conducted by focusing on dietary pattern through the PCA method. Using cross-country (region) data, the PCA helps in showing the distribution of principal components for various countries (regions) and classifies these countries (regions) into different dietary patterns according to their distribution characteristics. However, the PCA is not very helpful in the creation of rigorous projections because 1) it does not allow the simulation of changes for an endogenous variable when a shock is imposed on a selected exogenous variable; 2) a consistency between the PCA and economic theories such as utility maximization is not guaranteed and 3) it only provides the general analysis regarding China as a whole.

In order to have a comprehensive understanding of the characteristics of China's food consumption in this chapter, the expenditure elasticities in both urban and rural areas are estimated through two methods, namely the double logarithmic function (DLF) analysis and the LA/AIDS (linear approximate almost ideal demand system) analysis.

3.1 Food consumption in urban and rural China

As is well known, urban-rural gaps are significant in China. Clear distinctions exist between urban and rural diets owing to differences in income levels, developmental stages, and lifestyles. It is essential to incorporate both urban and rural China into the analyses in order to have a complete and precise understanding of China's feed grain demand.

Table 3.1 shows that although a rapid growth in income has been accomplished in both urban and rural areas in China, there are still great discrepancies. From 1978 to 2009, the per capita income in both urban and rural households has increased nearly 8 times, but the ratio of urban-rural income has increased from 2.6:1 to 3.3:1. As is presented in Figure 3.1, in the first ten years since the beginning of the reform in 1978, the per capita income in the rural areas grew at a higher speed than the urban areas mainly due to the improvement in productivity brought by land reform

and the rise of the private sector typical of township and village enterprises. However, in the next 20 years, growth of rural income tended to be slower compared with urban areas under the background that the emphasis of development was adjusted to cities.

Table 3.1 Urban-rural comparison of income

Year	Per capita annual disposable income of urban households		Per capita annual net income of rural households	
	Value(Yuan)	Index(1978=100)	Value(Yuan)	Index(1978=100)
1978	343.4	100.0	133.6	100.0
1980	477.6	127.0	191.3	139.0
1985	739.1	160.4	397.6	268.9
1986	899.6	182.5	423.8	277.6
1987	1002.2	186.9	462.6	292.0
1988	1181.4	182.5	544.9	310.7
1989	1375.7	182.8	601.5	305.7
1990	1510.2	198.1	686.3	311.2
1991	1700.6	212.4	708.6	317.4
1992	2026.6	232.9	784.0	336.2
1993	2577.4	255.1	921.6	346.9
1994	3496.2	276.8	1221.0	364.3
1995	4283.0	290.3	1577.7	383.6
1996	4838.9	301.6	1926.1	418.1
1997	5160.3	311.9	2090.1	437.3
1998	5425.1	329.9	2162.0	456.1
1999	5854.0	360.6	2210.3	473.5
2000	6280.0	383.7	2253.4	483.4
2001	6859.6	416.3	2366.4	503.7
2002	7702.8	472.1	2475.6	527.9
2003	8472.2	514.6	2622.2	550.6
2004	9421.6	554.2	2936.4	588.0
2005	10493.0	607.4	3254.9	624.5
2006	11759.5	670.7	3587.0	670.7
2007	13785.8	752.5	4140.4	734.4
2008	15780.8	815.7	4760.6	793.2
2009	17174.7	895.4	5153.2	860.6

Source: China Statistical Yearbook 2010.

Correspondingly, Engel's coefficient, which reflects the share of food in total consumption expenditure, shows clear discrepancies between urban and rural China. (Figure 3.1) As incomes increase, the Engel's coefficients decline sharply in both urban and rural China. Particularly at the end of 1980s, the Engel's coefficient for rural households was mostly approximate to the urban one owing to the higher income growth rate in rural areas. However, with income growth lagging behind, rural Engel's coefficient decreased at a slower speed than the urban one, leading to the enlarging urban-rural gap in the expenditure share of food. In 2009, urban households spent 37% of their total expenditure on food, 14% on transport and communication, and 12% on education, cultural and recreation service on the average, whereas rural households expended 41% on food and 20% on residence. (Figure 3.2 and Figure 3.3)

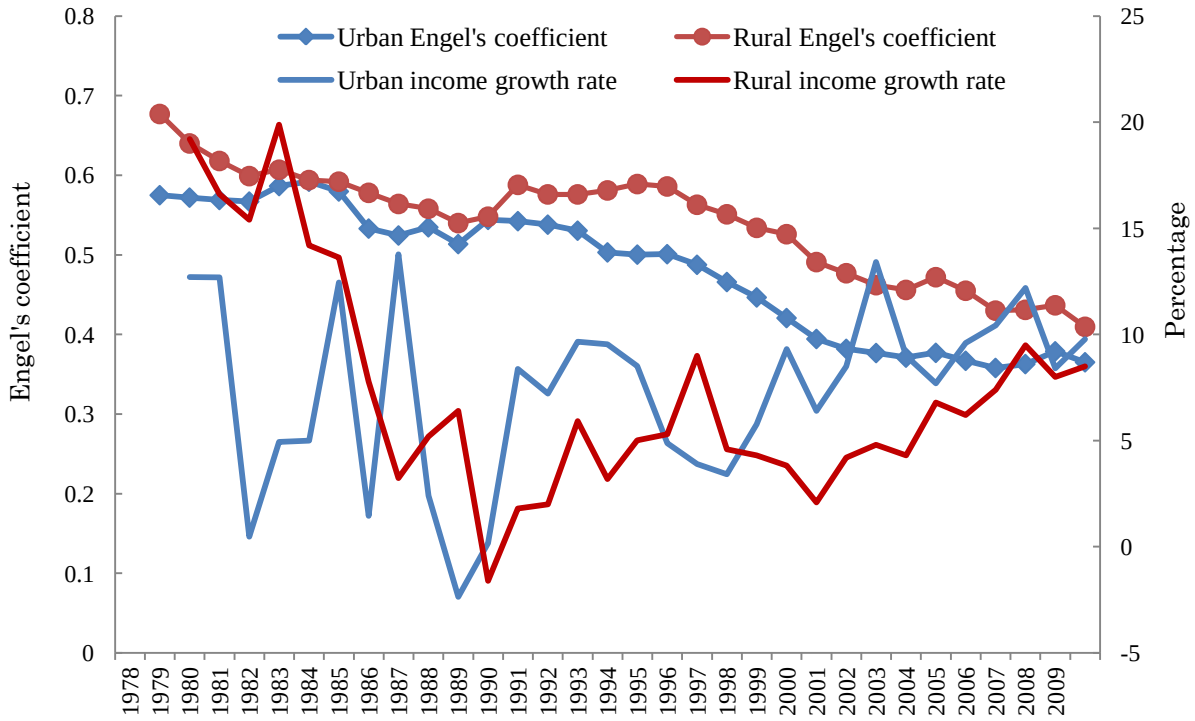

Figure 3.1 Engel's coefficient and income growth rate in urban and rural China, 1978-2009

Source: China Statistical Yearbook, various years.

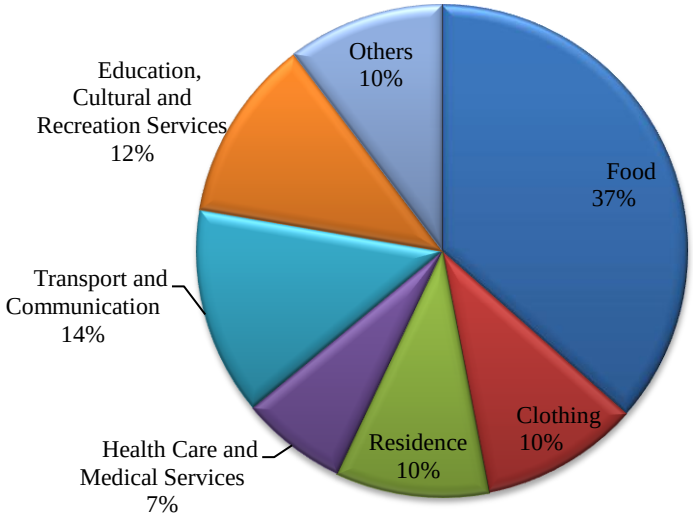

Figure 3.2 Composition of expenditure in urban China, 2009

Source: China Statistical Yearbook 2010.

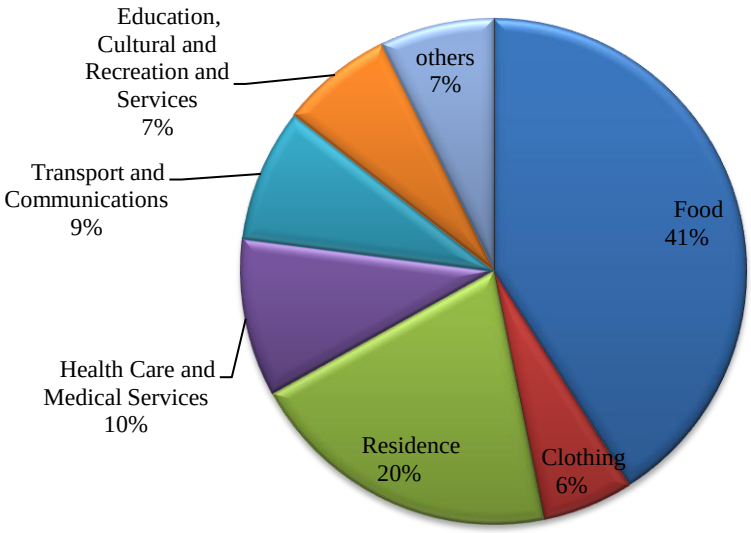

Figure 3.3 Composition of expenditure in rural China , 2009

Source: China Statistical Yearbook 2010.

Such income gaps, differences in the development stages and life styles between urban and rural China brought about obvious discrepancies in diets as Table 3.2 and Table 3.3 present. Among all the food items, per capita consumption both in urban and rural areas sees an increase except grain and vegetables from the 1980s to 2009. Noticeable growth in consumption is found for aquatic products, milk and poultry. Nevertheless, compared with urban households, rural households tend to consume much more food grain, significantly less meat, poultry and dairy products. For example, the average consumption of milk, pork and poultry in rural areas in 2009 is 3.6 kg, 13.96kg and 4.24 kg, respectively, accounting for 25%, 70% and 40% of that in urban areas in the

same year. In 2005, per capita consumption of aquatic products for rural residents was merely 5 kg, less than 40% of the urban level.

Table 3.2 Per capita consumption of major food items by urban households in China

Unit: kg/capita/year

Item	1985	1995	2000	2005	2008	2009
Grain	134.76	97.00	82.31	76.98	N.A.	81.33
Fresh Vegetables	144.36	116.47	114.74	118.58	123.15	120.45
Edible Vegetable Oil	5.76	7.11	8.16	9.25	10.27	9.67
Pork	16.68	17.24	16.73	20.15	19.26	20.50
Beef and Mutton	2.04	2.44	3.33	3.71	3.44	3.70
Poultry	3.24	3.97	5.44	8.97	8.00	10.47
Fresh Eggs	6.84	9.74	11.21	10.40	10.74	10.57
Aquatic Products	7.08	9.20	11.74	12.55	N.A.	N.A.
Milk	N.A.	4.62	9.94	17.92	15.19	14.91
Fresh Melons and Fruits	N.A.	44.96	57.48	56.69	54.48	56.55

Note: N.A.: not available.

Source: China Statistical Yearbook 2010.

Table 3.3 Per capita consumption of major food items by rural households in China

Unit: kg/capita/year

Item	1980	1985	1990	1995	2000	2005	2008	2009
Grain (Unprocessed)	257.16	257.45	262.08	256.07	250.23	208.85	199.07	189.26
: Wheat	N.A.	N.A.	80.03	81.49	80.27	68.44	62.74	59.56
Rice	N.A.	N.A.	134.99	129.25	126.82	113.36	110.98	105.67
Fresh Vegetables	127.21	131.13	134.00	104.62	106.74	102.28	99.72	98.44
Edible Oil	2.49	4.04	5.17	5.80	7.06	6.01	6.25	6.25
: Vegetable Oil	N.A.	N.A.	3.54	4.25	5.45	4.90	5.36	5.42
Meats, Poultry	7.75	10.97	12.59	13.56	18.30	22.42	20.15	21.53
: Pork	N.A.	N.A.	10.54	10.58	13.28	15.62	12.65	13.96
Beef	N.A.	N.A.	0.40	0.36	0.52	0.64	0.56	0.56
Mutton	N.A.	N.A.	0.40	0.35	0.61	0.83	0.73	0.81
Poultry	N.A.	N.A.	1.25	1.83	2.81	3.67	4.36	4.25
Eggs	1.20	2.05	2.41	3.22	4.77	4.71	5.43	5.32
Milk	N.A.	N.A.	1.10	0.60	1.06	2.86	3.43	3.60
Aquatic Products	1.10	1.64	2.13	3.36	3.92	4.94	5.25	5.27
Fruits	N.A.	N.A.	5.89	13.01	18.31	17.18	19.37	20.54

Note: N.A.: not available.

Source: China Statistical Yearbook 2010.

Considering the urban-rural gaps, it is not convincing to analyze China's food demand as a whole. Therefore, this chapter incorporates both urban and rural estimates into the research to identify the differences and commonalities between urban and rural China. For projections of food demand in China, estimating expenditure elasticitie is thought of as a useful means. In the following sections, two different methods are used to estimate the expenditure elasticites of demand for various food items, i.e., the double logarithmic function analysis and the LA/AIDS analysis.

3.2 Simplistic estimation of expenditure elasticities: double logarithmic function (DLF) analysis

Suppose the quantities demanded is specified as a double logarithmic function of two factors: real income factor and price relative to some overall index, i.e.,

$$\ln(Q_i) = \alpha_i + \beta_i \ln(y/PI) + \gamma_i \ln(p_i/PI),\ i = 1, 2, \ldots, n$$

where Q_i is the annual per capita consumption of food item i; y, the annual per capita total consumption expenditure (unit: yuan); PI, the index of all prices; ln, the natural logarithm; and α_i, the constant term. From the definition of elasticity, β_i and γ_i is the estimated expenditure and price elasticity corresponding to commodity i.

This function, also called as the constant-elasticity model (CEM), offers a direct and very simple way of measuring the reponses in which we are most interested (Deaton, 1975). However, care should be taken when the function is used for projection. Due to its inconsistency with the hypothesis of utility maximization, it tends to over-predict the expenditure of income elastic goods ($\beta_i > 1$), since if $\beta_i > 1$ the expenditure for commodity i will increase without limit leading to the limitlessly increasing budget share as real income increases. Despite this, the DLF analysis remains a useful method for estimation of expenditure elasticites.

Since the cross-sectional data grouped by income are used in this analysis to estimate the expenditure elasticity in every year over the sample period, the prices of commodities and consumer preferences per year are considered constant, and there is no need taking the index of prices into consideration; therefore, the double logarithmic function can be described as follows:

$\ln(Q_i) = \alpha_i + \beta_i \ln(y)$, i = 1, 2,…, n

3.3 Demand system estimation: linear approximate almost ideal demand system (LA/AIDS)

Apart from the relatively simple DLF analysis, this study also uses the complete demand system of LA/AIDS (Deaton and Muellbauer, 1980) to achieve more rigorous estimations of the expenditure elasticities of demand[6]. The LA/AIDS, an approximation to AIDS, is one of the most popular demand systems currently employed by economists for analyses of demand systems, largely owing to its consistency with consumption theory, its compatibility with aggregation over consumers, and the simplicity of its estimation of demand elasticities.

The function form of LA/AIDS can be described as follows:

$\omega_i = \alpha_i + \beta_i \ln(y/P^*) + \sum_j \gamma_{ij} \ln p_j \quad i = 1, 2,\ldots,n$

where y is the sum of the consumption expenditures of n food items, p_j denotes the price of item j, ω_i (equals $p_i q_i/y$) is the expenditure share of item i; P* here refers to the Stone index ($\ln P^* = \sum_j \omega_j \ln p_j$), which is regarded as an approximation to the price index in the AIDS model.

The LA/AIDS function satisfies the following three constraints:
1) adding up ($\sum_i \alpha_i = 1, \sum_i \beta_i = 0, \sum_i \gamma_{ij} = 0, \forall j$),
2) homogeneity ($\sum_j \gamma_{ij} = 0, \forall i$),
3) symmetry ($\gamma_{ij} = \gamma_{ji}, \forall i, j$).

The expenditure and price elasticities corresponding to the demand systems are:
1) expenditure elasticity $\eta_i = 1 + \beta_i/\omega_i$,

---

[6] In estimating expenditure elasticities, the LA/AIDS is consistent with microeconomic theory compared with the DLF analysis, as the estimates of the former are based on a complete demand system rather than simple regressions of consumption on income. The DLF is incorporated into the analysis for two reasons. First, through the DLF analysis, detailed expenditure elasticities of various meat products (i.e., pork, beef, and mutton) can be obtained, which are not available in data for the LA/AIDS analysis but are very useful in estimating the influences of the Chinese dietary structure on feed grain demand. Second, using different methods can help test the credibility of China's official data, which are usually subject to doubt.

2) own-price elasticity $\varepsilon_{ii} = -1 + \gamma_{ii}/\omega_i - \beta_i$, and
3) cross-price elasticity $\varepsilon_{ij} = \gamma_{ij}/\omega_i - \beta_i\omega_j/\omega_i$.

Most studies conducted before the 1990s (Chow, 1984; Van de Gaag, 1984; Lewis and Andrews, 1989) use a linear expenditure system (LES) to estimate expenditure elasticities in China and obtain a small number of available observations, limiting their applicability. During and after the 1990s, estimation using the almost ideal demand system (AIDS) became popular for price and expenditure elasticities. Estimations for urban or rural China, wholly or provincially, are carried out through this method (Halbrendt, Tuan, et al., 1994; Fan, Cramer, et al., 1994; Fan, Wailes, et al., 1995; Wu, Li, et al., 1995; Gao, Wailes, et al., 1996; Jiang and Davis, 2007). Shen (2007) estimates both the urban and rural demand systems using the LA/AIDS method, but he uses combined cross-sectional (income group data from urban areas and provincial data from rural areas) and time series data from 1985 to 1994 and 1985 to 1998 for urban and rural China respectively; this limits its applicability to the most recent situation. Zhou, Tian, and Malcolm (2008) try to explore the reasons that the projections for the supply and demand of feed grains differ and, after summarizing past forecasts, seek to identify ways of improving projections (the two most important ways involve estimating income elasticity using recent data and estimating the feed-meat conversion ratios for different production systems). However, they merely provide a summary of previous studies rather than make actual improvements through new empirical research.

This study differs from previous studies in the following ways: 1) it uses the latest data representing a longer time period (1995–2007) to estimate the expenditure elasticities of different food items; 2) it incorporates both urban and rural estimates into the research to identify the differences and commonalities between urban and rural China; and 3) it achieves a comparatively high applicability of estimation results by using the latest data.

3.4 Data

Expenditure, income, and consumption data were collected from sample surveys of urban and rural households. Sample surveys of urban households began in 1956, but were suspended during the Cultural Revolution (1966–1976) and were resumed in 1980. They are organized by the Department of Urban Social and Economic Survey of the National Bureau of Statistics (NBS) of China and are implemented by the NBS survey offices at the provincial level. At the end of 2007, the samples covered 59,000 households in urban China. Sample surveys of rural households began in 1954 and were suspended twice between 1954 and 1977 because of the movement of people's communes from 1958 to 1961 and the Cultural Revolution from 1966 to 1976. In 1977, the rural

surveys resumed. For the survey, sample villages are selected first, and then the households are selected from each province. In 2009, 68,000 sample households were selected for the surveys; these households were scattered across 7,100 villages in 857 counties and 31 provinces, autonomous regions, and municipalities.

The DLF analysis uses cross-sectional data from the sample surveys of urban and rural households reported in the *China Statistical Yearbook* and the *China Yearbook of Rural Household Survey* respectively. Expenditure and consumption data are reported by income groups, which are divided by per capita annual disposable income for urban China and per capita annual net income for rural China. For urban China, all the sample households are divided into 7 income groups in the order of per capita disposable income. For instance, the households from the bottom which account for 10% of the total sample households are grouped into the lowest income group. The other 6 groups, namely, the low, lower middle, middle, upper middle, high and highest income groups are grouped in the same method accounting for 10%, 20%, 20%, 20%, 10% and 10% of the total sample households respectively[7]. In rural China, all the sample rural households are divided into 5 groups by the same method, i.e., the low, lower middle, middle, upper middle and high income groups accounting for the same 20% of the total households for every group. The other grouping method for rural households is to divide sample households by various income intervals. In 1980, there were merely 9 income groups, whereas the number of groups increased to 12 for 1985 and 1990. From 1995, sample rural households have been divided into 20 income groups, which have kept the same income intervals till now. Consequently, expenditure elasticities of urban China are estimated according to data of 7 income groups, whereas rural ones are calculated according to data from two different income-grouping methods. Given the data availability, particularly in rural China, expenditure elasticities from 1980 to 2007(groups by income intervals) and from 2002 to 2007 (5 income groups) are estimated for rural China while urban ones covering 1995 to 2007 are calculated[8].

In the LA/AIDS analysis, pooled cross-sectional and time-series data are used from the sample surveys of urban and rural households. Data from the urban sample surveys of seven income groups, from 1995 to 2007, are reported in the *China Statistical Yearbook* and the *China Urban Life and Price Yearbook* and have relatively good accessibility. Seven food items—cereals, aquatic products,

---

[7] See Appendix B for the specific income and food consumption data of 7 income groups for urban households.

[8] See Appendix B for the specific income and food consumption data of two types of income groups for rural households.

meats (mainly composed of pork, beef, and mutton), poultry, milk, eggs, and vegetables—were selected for the analysis. These seven food items account for about 60% of the average food expenditure and can thus be regarded as the typical food items in the diet of the urban Chinese. In the abovementioned yearbooks, all the expenditure data needed in the LA/AIDS analysis can be collected except for separate expenditure data and expenditure share data on meat and poultry recorded before 2002 (these were reported as a combination at that time). These data were taken from the data on the consumption quantities of pork, beef, mutton, and poultry and their comparative relationships with the prices achieved; the latter were reported in the *China Yearbook of Agricultural Price Survey*[9]. The data on the prices of various food items are calculated on the basis of expenditure and consumption data, which represent the average prices of the food items actually consumed.

Compared with urban data, the data from the sample surveys in rural China are quite difficult to access. In the *China Statistical Yearbook*, expenditure and food consumption data are reported by 5 income groups and regions (provinces, autonomous regions, and municipalities) separately. Both of them report the income and expenditure data on broad commodity groups such as food, clothing, residence, education, and transportation, but the expenditure data on specific food items are not available. Moreover, food consumption data by regions are available, while consumption data by income groups are not reported in this yearbook. Consequently, detailed consumption data on food items by 5 income groups and 20 income groups as mentioned above are collected from the *China Yearbook of Rural Household Survey*. Since the 5-inome-group data merely cover the period 2002 -2007, data on 20 income groups for 1995 and 1998-2007 are finally employed for the LA/AIDS analysis in rural China considering the number of samples[10]. The food items in the rural LA/AIDS analysis, including cereals, meat, edible oil, poultry, vegetables, and eggs, do not exactly correspond to those in the urban demand analysis. Data on the expenditure and expenditure share for these items are not available and were derived from the prices and consumption data. While consumption data can be directly collected, most price data are calculated through a weighted average method by using the available price data and price indices taken from the *China Yearbook of Agricultural Price Survey*.

---

[9] For the detailed price data, see Table C.2 in C.1 of Appendix C.

[10] Regional data for rural China are also used for the LA/AIDS analysis. To reflect the influence of regional factors, regional dummy variables are established using results of principal component analysis (PCA) on food consumption of 31 provinces (autonomous regions, municipalities) in China. However, the estimation seems not to give reasonable results. For detailed data and estimation, see C.3 in Appendix C.

3.5 Empirical results

The estimation results are presented for the DLF and the LA/AIDS analyses. In the former, estimations on urban China using 7-income-group data and estimations on rural China using the 5-income-group data and 20-income-group data are reported separately.

3.5.1 Empirical results of the DLF estimation

1. DLF Estimation results of urban China

Considering the data availability and comparability between results, 12 food items (subgroups), i.e., grain, vegetables, pork, beef, mutton, beef & mutton, poultry, eggs, aquatic products, fruits, beer and milk[11] are chosen for the estimation. The results are presented in Tables 3.4; the data for several years are used as examples.[12]

In urban China, as Table 3.4 shows, the expenditure elasticities of most food items are significant, and the consumption of most food items can be thoroughly explained by the equation. The expenditure elasticities of most food items declined from 1995 to 2007, and almost all commodities were considered necessity goods (with a positive expenditure elasticity of less than 1), except milk in 1995 and grain in 2002.

Of all the commodities, grain had the lowest expenditure elasticity and turned into inferior goods (with a negative expenditure elasticity) in the 2000s; this means that the consumption of cereals tends to decline when incomes increase. Non-staple foods such as meats, poultry, vegetables, aquatic products, and fruits are more expenditure elastic than staple foods like cereals.

Milk is the most expenditure elastic, especially as observed in the 1990s and the early 2000s, indicating the influence of Western diets on Chinese diets. Until the 1990s, the consumption of milk was very low, about 5 kg per capita per year. Over the past 20 years, the Chinese have become conscious of the nutrient values of milk, which has become affordable due to China's increasing income. By 2010, the per capita consumption of dairy products had almost tripled to 20 kg.

---

[11] Since this study is more concerned about the elasticity comparisons of milk total between urban and rural china, the specific items including liquid milk, powder milk and yogurt are not included here. For the expenditure elasticities of these items in urban areas, see Appendix B.

[12] For detailed estimation results, see Appendix B.

Table 3.4 DLF estimation results: expenditure elasticities in urban China (7 income groups)

Commodity i	1995			2002			2007		
	Elasticity	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2
Grain	**0.072**	2.866	0.546	**-0.084**	-7.757	0.908	**(–)**	(–)	(–)
Vegetables	**0.307**	32.724	0.994	**0.080**	3.481	0.649	**0.164**	4.190	0.734
Pork	**0.442**	15.694	0.976	**0.207**	5.221	0.814	**0.274**	6.655	0.878
Beef	**0.633**	10.760	0.950	**0.326**	4.364	0.750	**0.314**	4.503	0.763
Mutton	**0.653**	11.830	0.959	**0.394**	3.307	0.623	**0.247**	3.031	0.577
Beef &mutton	**0.641**	13.027	0.966	**0.350**	3.899	0.703	**0.291**	3.990	0.713
Poultry	**0.661**	14.571	0.972	**0.545**	12.674	0.964	**0.402**	9.880	0.942
Eggs	**0.405**	11.530	0.957	**0.158**	3.732	0.683	**0.227**	3.968	0.711
Aquatic products	**0.533**	10.745	0.950	**0.623**	27.861	0.992	**0.523**	12.598	0.963
Fruits	**0.763**	12.008	0.960	**0.488**	7.515	0.902	**0.446**	8.265	0.918
Beer	**0.774**	10.404	0.947	**0.362**	3.423	0.641	**0.353**	3.647	0.672
Milk	**1.014**	18.778	0.983	**0.990**	8.580	0.924	**0.571**	7.648	0.906

Source: Author's estimates.

During the same period, relationships of expenditure elasticities between aquatic and livestock products experienced significant changes as seen in Figure 3.4. Aquatic products changed from being lesser income elastic than poultry and beef in 1995 to being the second most expenditure elastic commodity after milk. These results suggest that, when incomes increase, urban residents spend more money on seafood than on pork, beef, mutton, or poultry. Among livestock products and poultry, the expenditure elasticity of poultry is much higher than that of meat; this can be explained by the fact that poultry is considered to be richer in nutrients than other meats. Among livestock products, consumption of pork is overwhelmingly greater than that of beef and mutton. This is a general characteristic of Chinese diets, except in several regions composed mainly of minorities, such as Xinjiang, Qinghai, and Ningxia. Consequently, the demand for pork is less expenditure elastic than that for beef and mutton.

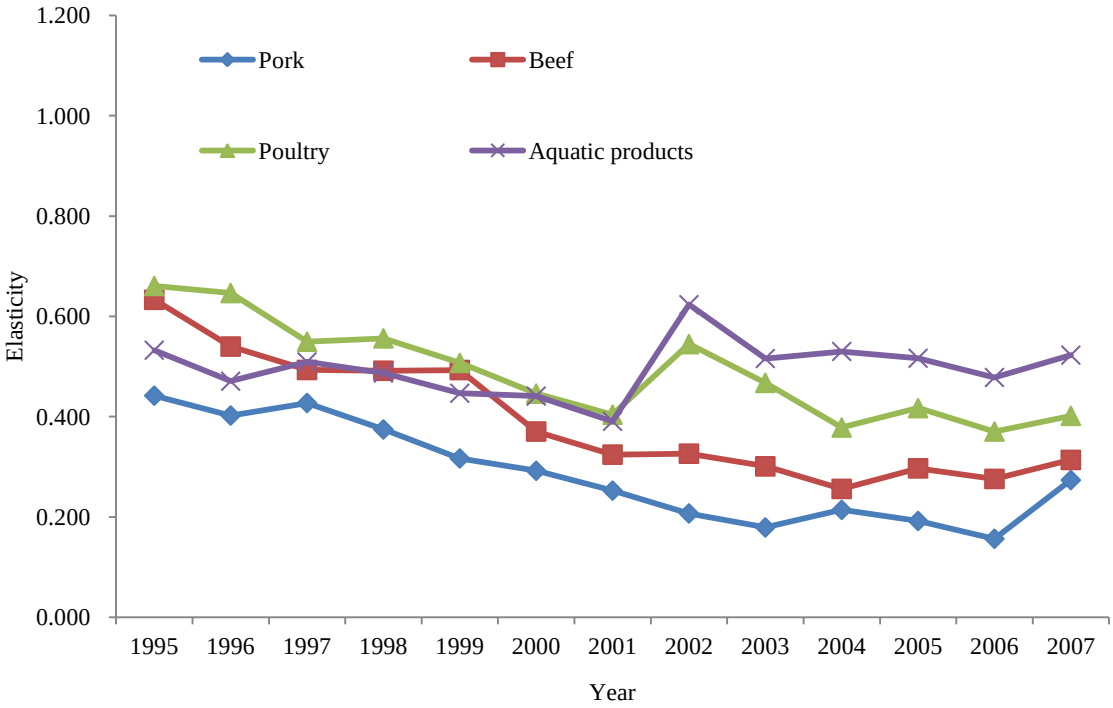

Figure 3.4 Expenditure elasticities of livestock and aquatic products in urban China (7 income groups), 1995-2008

Source: Author's estimates.

2. DLF estimation results of rural China

1) Estimation results based on data by 5 income groups

In total, 10 food items (subgroups), namely grain, vegetables, pork, beef & mutton, poultry, eggs, aquatic products, fruits, milk and sugar are included in the estimation. The results for 2002, 2005 and 2007 are demonstrated in Table 3.5[13].

By comparing the estimation results with urban China, a similar trend can also be found in rural circumstances. However, partly owing to their lower income levels and development, expenditure elasticities in rural areas are greater than those in urban areas for the same food items. As a result, while grain has become inferior goods in urban China, it is still necessity goods in rural China although the value is very close to zero. Similarly, aquatic products are already necessity goods for urban residents but remain luxury goods in rural areas. Besides, although expenditure elasticities for most food items (such as pork, poultry, aquatic products, and fruit) have been declining in urban China, they were still rising for beef& mutton, and milk in rural China until 2007 (Figure 3.5). For instance, the expenditure elasticity for beef and mutton rose from 0.456 in 2002 to 0.539 in 2007.

[13] See Appendix B for the detailed estimation results from 2002 to 2007.

However, it should be noted that the expenditure elasticity for beef and mutton in urban areas reached 0.641 in 1995, higher than the level in 2007 for rural areas; this indicates that there is room for further increase and that this rise will not continue forever if we assume that the diets of rural residents will follow a growth path similar to that of urban China. What is true of milk is true of beef and mutton.

Table 3.5 DLF estimation results: expenditure elasticities in rural China (5 income groups)

Commodity i	2002			2005			2007		
	Elasticity	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2
Grain	**0.109**	3.123	0.686	**0.080**	3.088	0.681	**0.090**	2.642	0.599
Vegetables	**0.299**	3.283	0.710	**0.317**	3.736	0.764	**0.332**	4.569	0.832
Pork	**0.382**	24.085	0.993	**0.270**	2.999	0.666	**0.277**	12.677	0.976
Beef &mutton	**0.456**	3.026	0.671	**0.467**	2.512	0.570	**0.539**	4.048	0.794
Poultry	**1.052**	12.994	0.977	**0.966**	11.106	0.968	**0.858**	11.524	0.971
Eggs	**0.753**	7.124	0.926	**0.902**	8.062	0.941	**0.844**	8.717	0.949
Aquatic products	**1.424**	13.691	0.979	**1.481**	17.946	0.988	**1.336**	19.527	0.990
Fruits	**0.722**	19.308	0.989	**0.698**	14.471	0.981	**0.688**	33.628	0.996
Milk	**0.763**	2.467	0.560	**0.803**	5.717	0.888	**0.859**	10.091	0.962
Sugar	**0.578**	21.729	0.992	**0.369**	6.027	0.898	**0.302**	9.562	0.958

Source: Author's estimates.

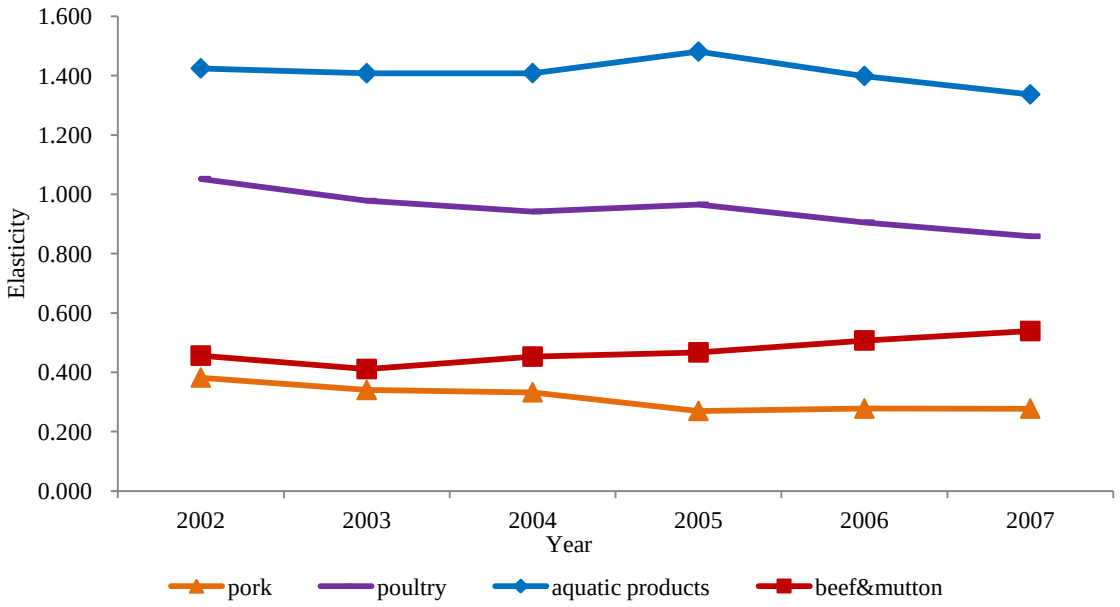

Figure 3.5 Expenditure elasticities of livestock and aquatic products in rural China (5 income groups), 2002-2007

Source: Author's estimates.

When comparisons are made between the results of this study and the expenditure elasticities used by the OECD to make China's food demand projections (Database-OECD-FAO Agricultural Outlook 2011–2020 and OECD /FAO [2011]), it is found that the DLF expenditure elasticities for beef, pork, and poultry in both rural and urban China estimated in this chapter are much smaller than those used by the OECD (see Table 3.6). Using these parameters in AGLINK-COSIMO models (for details of AGLINK-COSIMO models, see [OECD, 2007]), the OECD projected that by 2020 China's consumption of coarse grains for feed use would reach 137,651,000 tonnes (Database-OECD-FAO Agricultural Outlook 2011–2020). As the origin of these parameters was not identified, it is difficult to evaluate their accuracy by comparing the models and methods of the two studies. However, if the results of this study possess a reasonable level of accuracy, they would mean the OECD may have overestimated China's feed grain demand.

Table 3.6 Estimates of expenditure elasticities for China

Commodity i	Urban (DLF-7 income group) (2006)	Rural (DLF-5 income group) (2006)	OECD
Beef	0.276	0.647	1.593
Pork	0.157	0.278	0.709
Mutton	0.254	0.410	1.602
Poultry	0.370	0.905	0.983
Aquatic products	0.478	1.399	N.A.

Note: 1) OECD refers to the expenditure elasticities that OECD used for food demand projections with respect to China.

2) N.A.: not available.

Source: Author's estimates and AGLINK-COSIMO model, 2009 version database.

2) Estimation results based on data by 20 income groups

Table 3.7 presents the estimation results for rural China using data on 20 income groups for 1995, 2000, 2002, 2005 and 2007[14]. The expenditure elasticities of most food items are significant at 5% (except that grain in 2005 and milk in 2002 are significant at 10%), and the consumption of most food items can be thoroughly explained by the equation.

[14] For detailed estimation results covering 1980 to 2007, see Appendix B.

The expenditure elasticities show similar changing tendencies with those in the results using data on 5 income groups. On the whole, the elasticities for the 20-income-group data tend to be comparatively larger than the latter probably due to the different grouping methods. For instance, the expenditure elasticities of aquatic products are 1.424, 1.481 and 1.223 in 2002, 2005 and 2007 respectively in the 5-income-group estimation, whereas they are 1.657, 1.650 and 1.394 respectively in the 20-income-group estimation.

Despite the relatively large values compared with the estimation results based on 5-income-group data, high consistency is found in the relationship of expenditure elasticities for meat and aquatic products between these two estimations. As Figure 3.6 shows, from 1995 to 2007, expenditure elasticities of all these meat (as a whole), poultry and aquatic products tended to decline continuously (the expenditure elasticity of poultry experienced an increase at first by the end of the 1990s and started to decline from 2000). Specifically, meat as a whole is much less income elastic than poultry, and aquatic products are even more income elastic than poultry; this means rural households tend to consume more aquatic products and poultry rather than meat when their incomes increase. These results are consistent with the 5-income-group estimations for rural households.

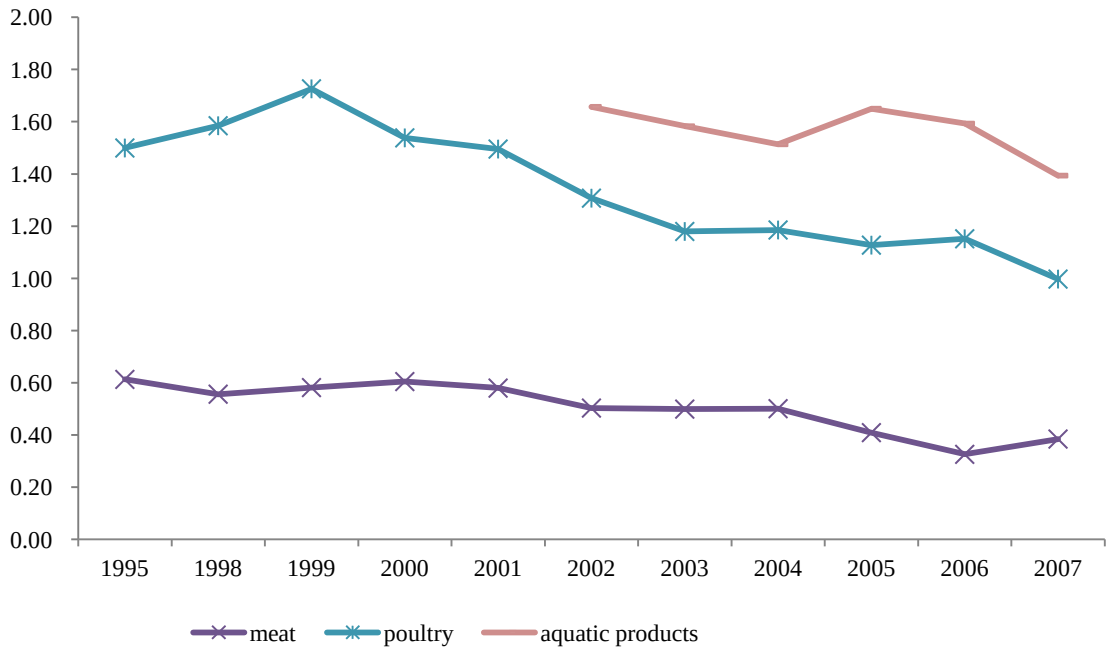

Figure 3.6 Expenditure elasticites of livestock and aquatic products in rural China (20 income groups) , 1995-2007

Source: Author's estimates.

Table 3.7 DLF estimation results: expenditure elasticities in rural China (20 income groups)

Commodity i	1995			2000			2002			2005			2007		
	Elasticity	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2	**Elasticity**	t-statistic	Adjusted R^2
Grain	**0.186**	7.852	0.781	**0.195**	9.046	0.826	**0.195**	7.737	0.776	**0.126**[a]	2.074	0.163	**0.158**	2.560	0.246
Vegetables	**0.380**	3.653	0.421	**0.669**	7.935	0.785	**0.560**	8.483	0.807	**0.546**	10.319	0.861	**0.517**	7.570	0.768
Edible oil	**0.465**	14.701	0.927	**0.241**	3.161	0.346	**0.483**	9.243	0.832	**0.508**	9.643	0.844	**0.522**	19.857	0.959
Fruits	**NA**	NA	NA	**NA**	NA	NA	**0.863**	11.082	0.878	**0.894**	11.847	0.891	**0.691**	4.879	0.573
Meat [b]	**0.613**	12.202	0.897	**0.605**	12.733	0.905	**0.503**	8.787	0.818	**0.409**	4.363	0.515	**0.384**	5.869	0.663
Milk	**NA**	NA	NA	**NA**	NA	NA	**0.289**[a]	1.891	0.132	**0.558**	4.448	0.525	**0.647**	2.620	0.257
Poultry	**1.499**	26.302	0.976	**1.538**	13.233	0.911	**1.307**	17.318	0.946	**1.127**	10.207	0.859	**0.997**	12.717	0.904
Eggs	**1.062**	17.084	0.945	**1.062**	16.610	0.942	**1.049**	14.485	0.925	**1.084**	10.185	0.858	**1.049**	11.125	0.878
Sugar	**0.601**	23.447	0.970	**0.680**	8.815	0.819	**0.538**	4.526	0.534	**0.413**	4.301	0.507	**0.321**	2.579	0.250
Aquatic products	**NA**	NA	NA	**NA**	NA	NA	**1.657**	27.566	0.978	**1.650**	16.243	0.939	**1.394**	14.469	0.925

Note: [a] Significant at 10%.

[b] Meat means the sum of pork, beef and mutton.

Source: Author's estimates.

3.5.2 Empirical results of the LA/AIDS analysis

The seemingly unrelated regression (SUR) [15]is used to estimate urban and rural demand systems by removing the equations for vegetables and eggs from the urban and rural systems, respectively. All the three restrictions of adding-up, homogeneity, and symmetry are imposed on the equations. The results of the LA/AIDS for urban and rural China are presented in Table 3.8 and 3.9.

In the estimated urban demand system shown in Table 3.8, all the parameter estimates of expenditure and most of the estimates of price coefficients are significant at the 5% level. The adjusted R-squared statistics range from 0.736 for eggs to 0.939 for milk. According to the coefficient estimates, expenditure elasticities of various commodities can be calculated as presented in the last column.

On the whole, the results of the expenditure elasticities show a high consistency with the results of the DLF for urban China[16]. Specifically, grain has negative expenditure elasticity; this is consistent with the DLF results in Table 3.4. Aquatic products, milk, and poultry are among the most expenditure elastic commodities, and meats are much less expenditure elastic than aquatic products and poultry, indicating a pattern similar to that seen in previous DLF results.

---

[15] For detailed explanation of SUR, see Zellner (1962).

[16] It should be noted that expenditure elasticities in our LA/AIDS and DLF analyses cannot be compared directly with each other for two reasons. First, expenditure elasticities in our LA/AIDS estimation are conditional elasticities. Under the separability assumption, the sum of the expenditures on several food items (instead of the total consumption expenditure composed of food, clothing, education, transportation, medical care and etc.) is considered as the expenditure. As a result, the expenditure elasticities in the LA/AIDS in this study tend to be greater than usual. However, the relationships among expenditure elasticities of different food items can be compared, and consistency between the results of these two estimation methods is found. Second, distinct types of data utilized in these two analyses also lead to differences in the values of the estimated expenditure elasticities. Cross-sectional data are used in the DLF analysis, which estimate the elasticities for the short run. In contrast, the LA/AIDS analysis uses pooled cross-sectional data and time series data, giving the estimates for a comparatively long run; this is often accompanied by "the changes in tastes and lifestyles", "changes in marketing systems, and occupational changes" particularly in Asian economies which already undergo "rapid structural transformation and urbanization". (Huang and Bouis, 2001).

Table 3.8 LA/AIDS results for urban China: estimators and expenditure elasticities

Commodity i	α_i	β_i	γ_{i1}	γ_{i2}	γ_{i3}	γ_{i4}	γ_{i5}	γ_{i6}	γ_{i7}	Adjusted R^2	Expenditure elasticity
Grain	2.313	-0.335	0.257	-0.059	-0.083	-0.059	-0.065	0.042	-0.033	0.913	-0.860
	(19.123)	(-18.972)	(11.395)	(-9.351)	(-4.657)	(-5.446)	(-4.956)	(4.861)	(－)		(-8.774)
Aquatic products	-1.034	0.199		0.093	-0.044	0.000	0.029	-0.013	-0.006	0.749	2.668
	(-12.081)	(14.185)		(15.230)	(-5.548)	(-0.059)	(5.966)	(-4.405)	(－)		(22.690)
Meats	-0.282	0.038			0.295	-0.054	-0.038	0.020	-0.096	0.878	1.130
	(-2.280)	(2.087)			(10.856)	(-4.381)	(-2.549)	(2.787)	(－)		(18.122)
Poultry	-0.372	0.084				0.051	0.051	-0.014	0.025	0.919	2.302
	(-5.051)	(7.794)				(5.315)	(6.008)	(-3.238)	(－)		(13.782)
Milk	-0.304	0.080					-0.058	-0.034	0.115	0.939	2.309
	(-3.034)	(5.284)					(-3.955)	(-6.228)	(－)		(9.320)
Eggs	0.385	-0.058						0.011	-0.012	0.736	-0.111
	(6.918)	(-6.849)						(2.140)	(－)		(-0.683)
Vegetables	0.294	-0.008							0.007	(－)	0.953
	(－)	(－)							(－)		(－)

Note: 1) Numbers in parentheses are t-test values.

2) Elasticities are calculated using average expenditure shares of various food items during the estimation period.

Source: Author’s estimates.

Table 3.9 LA/AIDS results for rural China: estimators and expenditure elasticities

Commodity i	α_i	β_i	γ_{i1}	γ_{i2}	γ_{i3}	γ_{i4}	γ_{i5}	γ_{i6}	Adjusted R^2	Expenditure elasticity
Grain	2.311	-0.254	0.287	-0.034	-0.066	-0.050	-0.088	-0.049	0.839	0.365
	(24.801)	(-21.099)	(11.036)	(-2.041)	(-8.591)	(-5.162)	(-8.042)	(－)		(12.134)
Meats	-0.088	0.024		0.080	-0.03	-0.002	-0.023	0.008	0.769	1.112
	(-1.369)	(2.963)		(4.335)	(-3.428)	(-0.110)	(-2.592)	(－)		(29.475)
Edible oil	-0.04	-0.004			0.044	0.031	-0.016	0.037	0.513	0.936
	(-1.505)	(-1.266)			(5.605)	(3.999)	(-3.806)	(－)		(18.554)
Poultry	-0.469	0.061				0.064	-0.024	-0.119	0.555	3.065
	(-13.212)	(14.358)				(2.346)	(-2.949)	(－)		(21.310)
Vegetables	-0.323	0.113					0.148	0.003	0.766	1.441
	(-6.175)	(15.118)					(16.042)	(－)		(49.402)
Eggs	-0.390	0.060						0.119	(－)	2.920
	(－)	(－)						(－)		(－)

Note: 1) Numbers in parentheses are t-test values.

2) Elasticities are calculated using average expenditure shares of various food items during the estimation period

Source: Author's estimates.

Table 3.9 shows the parameter estimates and other statistics for the rural demand system. All the expenditure estimates (except for edible oil) are significant at the 1% level, and most estimates of price coefficients are significant at the 5% level. The adjusted R-squared statistics range from 0.513 for edible oil to 0.839 for cereals.

Expenditure elasticities are reported in the last column. Grain is the most income inelastic among the six food items, but its expenditure elasticity is still positive, indicating that it is normal goods, as in the DLF results. Compared with meats, poultry has much higher expenditure elasticities; this is also consistent with the DLF analysis results. Again, in the LA/AIDS analysis, urban-rural differences similar to those in the DLF estimation results can be found.

In addition, the Marshallian own- and cross-price elasticities for urban and rural China are presented in Table 3.10 and Table 3.11.

In urban China, own-price elasticities are negative for all the food items except grain. With the price of grain rises, consumption of grain will increase rather than decline on the contrary, which is characteristic of Giffen goods. Among the seven food items, consumption of milk is the most price-elastic, reflecting the newly developing demand for dairy products. Compared with meats, aquatic products and poultry meat are more price-elastic, indicating that a uniform percentage decline in the prices of these commodities will elicit a greater demand for seafood and poultry than for meats.

Table 3.10 Marshallian price elasticities for urban China

	Grain	Aquatic products	Meats	Poultry	Milk	Eggs	Vegetables
Grain	0.762	-0.106	0.082	-0.208	-0.247	0.330	0.137
Aquatic products	-0.795	-0.420	-0.856	-0.108	0.141	-0.196	-0.337
Meats	-0.308	-0.166	-0.028	-0.193	-0.138	0.062	-0.351
Poultry	-1.149	-0.155	-1.217	-0.294	0.711	-0.285	0.364
Milk	-1.299	0.318	-1.004	0.750	-2.029	-0.625	1.657
Eggs	1.004	-0.116	0.707	-0.196	-0.583	-0.731	-0.039
Vegetables	-0.184	-0.029	-0.545	0.148	0.672	-0.067	-0.951

Source: Author’s estimates.

By analyzing the cross-price elasticities, comparatively strong substitute relationship can be found between grain and eggs, grain and vegetables, aquatic and dairy products, poultry and milk, poultry and vegetables, milk and vegetables, meats and eggs. Grain and meats are substitutes in a

degree, but their relationship is not very significant. The most significant substitute relationships for urban residents are among various sources of protein intakes such as seafood, poultry and milk, meats and eggs. In addition, the substitute relationship also takes place between intakes of proteins (from poultry and milk) and the vegetable intakes, which tends to indicate the increasing concern for health in urban areas.

Table 3.11 Marshallian price elasticities for rural China

	Grain	Meat	Poultry	Edible oil	Vegetables	Eggs
Grain	-0.030	0.053	-0.106	-0.124	-0.057	-0.102
Meats	-0.201	-0.653	-0.011	-0.145	-0.135	-0.331
Poultry	-2.504	-0.504	1.082	0.908	-1.346	-4.055
Edible oil	-0.986	-0.440	0.475	-0.320	-0.232	0.567
Vegetables	-0.519	-0.185	-0.108	-0.092	-0.535	-0.001
Eggs	-2.335	-0.163	-3.868	1.066	-0.390	2.770

Source: Author's estimates.

In rural China, most own-price elasticities are negative except poultry and eggs. Compared with meats, edible oil or vegetables, the own-price elasticity of grain is inelastic, an indication of the staple status. The most obvious substitute relationship can be found between edible oil and poultry, edible oil and eggs, implying a choice between oils &fats and poultry products.

3.5.3 Implications of estimation results on the projections for China's feed grain demand

The above results have important implications for projections of China's feed grain demand in the years ahead. While food grains become inferior goods (as the incomes increase), demand for feed grains is expected to increase continuously owing to the increasing demand for livestock products. If China follows Western dietary patterns and becomes dependent on meats, especially beef, China will face the stress of a soaring feed grain demand and may have to import more grains for the production of meat products, since the feed-meat conversion ratio of beef is much larger than that of pork or poultry[17]. However, the estimations of expenditure elasticities show that the

[17] Feed-meat conversion ratio is used to measure an animal's efficiency in converting feed mass into increased body mass. Although estimates for China differ among various studies, it is agreed that the feed-meat conversion ratios of beef and pork are significantly larger than those of poultry and fish. At the

Chinese tend to consume more aquatic products than meats and poultry when their incomes increase; this pattern is different from the Western one. Even among meats and poultry, poultry is much more income elastic than pork, beef, or mutton. Moreover, among the livestock products, the expenditure elasticity of beef and mutton is higher than that of pork, but the expenditure share of pork is significantly larger than that of beef and mutton. These results can be explained by China's realities and dietary characteristics. In spite of the influences China has felt over the last three decades that have led to higher consumption of milk and beef, the Chinese still regard aquatic products as premium food, believe in the nutrient value of poultry, and retain pork as their predominant meat product. Compared with beef, the provision of aquatic products, poultry, and pork requires far fewer feed grains; this means that the increase in feed grains may be mild and thus lead to less stress on China's feed grain balance.

3.6 Summary

This chapter provides an analysis of the prospects for China's feed grain demand by estimating the expenditure elasticities of major food items—such as meats, poultry, and aquatic products—in urban and rural areas through the DLF and LA/AIDS analyses, respectively.

A high degree of consistency is found between the results of the DLF and LA/AIDS analyses. In both, the expenditure elasticities of most food items are declining, and most food items are normal goods with positive expenditure elasticities (the only exception being grain, which has been inferior goods for urban areas with negative elasticities) for both urban and rural areas. Moreover, for the same food item, the expenditure elasticity in urban China is smaller than that in rural China, reflecting differences in development and income levels between the two regions. The most important finding is regarding the differences and relationships among the expenditure elasticities across food items. Aquatic and poultry products are more income elastic than other meat products such as pork, beef, and mutton. When incomes increase, both the urban and rural Chinese tend to consume more aquatic and poultry products than beef or pork. This demonstrates the possibility of a relatively moderate increase in feed grain demand since poultry and aquatic breeding require lesser feed grain than beef and pork.

This result is also consistent with the results obtained by the principal component analysis in the

---

maximum, to put on 1 kg of body weight, cattle need about 10 kg of feed, a pig needs 8 kg of feed, while poultry and fish need only 5 kg and 2 kg respectively (Zhou and Tian, 2005).

previous chapter, which reveals that China is following a dietary pattern different from the Western one and closer to that in developed East-Asian countries (regions) like Japan, Korea, Hong Kong, and Taiwan as the Chinese tend to consume more seafood than pork, beef, and other meat products when incomes increase. Furthermore, comparisons between our estimation results and the expenditure elasticities used by the OECD for its food demand projections show that the OECD may be overestimating China's feed grain demand.

Chapter 4 Supply-demand model of feed grain

In chapter 2 and chapter 3, the demand side is analyzed in detail with respect to dietary patterns and expenditure elasticities. To develop a supply-demand model of feed grain in China, population—another important factor on the demand side—as well as the factors affecting the supply side need to be taken into consideration to determine the assumptions concerning China's population changes and domestic supply capacity in the model. In the first half of this chapter, analyses of historical changes and projections for the future changes relevant to population are reviewed in detail, and area of arable land and yield are both taken into consideration. Then in the last half of this chapter, estimation results of expenditure elasticities in chapter 3 are incorporated into the supply-demand model of feed corn by developing three scenarios to simulate possible influences on the world market by China's domestic demand. In conclusion, policy proposals are made in order to assist sustainable grain self-sufficiency in China.

4.1 Population factor

4.1.1 History of population changes

China's population has witnessed significant quantitative and structural changes over the past 60 years since the foundation of People's Republic of China (PRC) in 1949. The total population has much more than doubled, reaching 1.34 billion. The structural changes were mainly displayed in age composition and urban-rural distribution. The proportion of the urban residents increased sharply particularly after 1978, and the new problem of population ageing emerged. These changes in population played an important role in transition of Chinese people's diets.

Changes in the total population were closely related with changes in population policies. Before the 1970s, China's population policy experienced great variations due to the unstable political situation and the inconsistent population ideologies of the leaders at that time. Contradictions could be found in the speeches of Chairman Mao Tse-Tung, who thought it necessary to perform birth control on one hand, while also believed in "The more people, the more power" on the other hand. The family planning practice in this early stage was mainly confined to urban areas and not performed consistently. Although the National Family Planning Commission was established in 1964, it was paralyzed soon after the beginning of Cultural Revolution. The frequent suspensions

of family control during the "Great Leap Forward" from 1958 and the Cultural Revolution, led partly to the second spike in the numbers of babies born from 1962 to 1972[18]. During these 10 years, a total of 300 million babies were born, and the average population growth rate jumped to 2.74% and 2.33% [19]for the periods of 1965-1970 and 1970-1975, respectively. As a result, the total population increased nearly 300 million people to 830 million over only 20 years up to 1970 (Table 4.1).

Table 4.1 Changes in Population and urban-rural distribution, 1949-1979

Unit: 10,000 persons, %

Year	Total population	Urban		Rural	
		Population	Proportion	Population	Proportion
1949	54167	5765	10.64	48402	89.36
1950	55196	6169	11.18	49027	88.82
1951	56300	6632	11.78	49668	88.22
1955	61465	8285	13.48	53180	86.52
1960	66207	13073	19.75	53134	80.25
1965	72538	13045	17.98	59493	82.02
1970	82992	14424	17.38	68568	82.62
1971	85229	14711	17.26	70518	82.74
1972	87177	14935	17.13	72242	82.87
1973	89211	15345	17.20	73866	82.80
1974	90859	15595	17.16	75264	82.84
1975	92420	16030	17.34	76390	82.66
1976	93717	16341	17.44	77376	82.56
1977	94974	16669	17.55	78305	82.45
1978	96259	17245	17.92	79014	82.08
1979	97542	18495	18.96	79047	81.04

Note: Data in this table do not include the population of Hong Kong Special Administrative Region (SAR), Macao SAR and Taiwan Province.

Source: China Statistical Yearbook 2010.

[18] The first round of baby boom after 1949 was from 1953 to 1957, which was said to be largely due to the steady conditions after the war, economic growth and improvement in medical and health care.

19 Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm

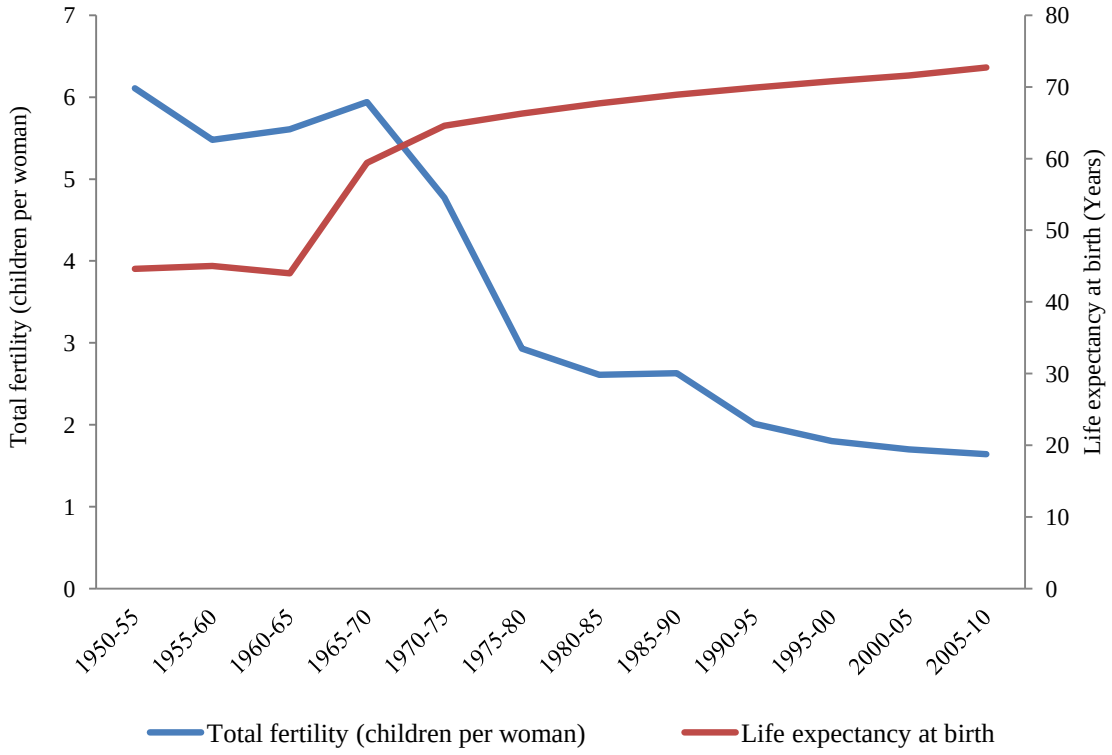

Figure 4.1 Changes in the total fertility, 1950-2010

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm

In the early 1970s, the Chinese government set a clear target at controlling population growth rate in the formal government documents for the first time, aiming to reduce the natural growth rate during the fourth five-year plan period to 10‰ and 15‰ in urban and rural areas, respectively. From 1973, the family planning practice was developed throughout China, and the slogan of "Later, longer and fewer" was put forward, advocating late marriage and pregnancies, longer intervals between children and fewer children. The one-child policy, known as the most strict family planning policy, was introduced in 1979. Since then, family planning has been regarded as a national fundamental policy and was formulated into the constitution, aiming at controlling the population size and improving the quality. By rigorous punishing measures and political and economical incentives including certificates of the only child, monthly cash award, etc., the family planning program, although controversial in its compulsory aspects, attained effective progress in restricting the population size. The total fertility rate[20](Figure 4.1), measured by

[20] According to the UN report "World Population Ageing: 1950-2050", the total fertility rate refers to the

children per woman, stayed relatively stable around 6 before the 1970s, whereas it dropped rapidly to about 3 during 1975 to 1980. After 1980, the fertility rate continued to decline at a slower speed. From 2005 to 2010, the average number of children per woman would have reached 1.64, decreasing to about 1/3 and 1/2 of the number in the early 1970s and late 1970s. Correspondingly, the natural growth rate, declined quickly after increases in the late 1970s and the 1980s to the present 5‰ level, about 1/3 of that in 1990 (Table 4.2).

Apart from the slowing growth rate, significant changes occurred in the regional distribution of the population. In the first 30 years, the proportion of urban residents rose merely 8 per cent from 10.64% in 1979 to 18.96%, whereas it jumped nearly 30 per cent to almost 47% in the subsequent 30 years (Table 4.1 and 4.2). These changes were closely related to the reform and open-up policy started in 1978, which brought about dramatic economic growth and accelerating urbanization. Population changes in regional distribution are of great importance to food consumption patterns. Compared with rural households, urban households need relatively less caloric intakes to maintain their metabolism on the average, and tend to consume more expensive food such as meat, seafood and dairy products and less staple food such as grains due to the differences in the life style and income levels. That is also why this study endeavors to incorporate both urban China and rural China.

---

average number of children a woman would bear over the course of her lifetime if current age-specific fertility rates remained constant throughout her childbearing years (normally between the ages of 15 and 49). The current total fertility rate is usually taken as an indication of the number of children women are having at the present.

Table 4.2 Changes in Population and urban-rural distribution, 1980-2009

unit:1,000 persons, %

Year	Population (year-end)	Natural Growth [1] Rate(‰)	Urban		Rural	
			Population	Proportion	Population	Proportion
1980	98705	11.87	19140	19.39	79565	80.61
1985	105851	14.26	25094	23.71	80757	76.29
1990	114333	14.39	30195	26.41	84138	73.59
1991	115823	12.98	31203	26.94	84620	73.06
1992	117171	11.60	32175	27.46	84996	72.54
1993	118517	11.45	33173	27.99	85344	72.01
1994	119850	11.21	34169	28.51	85681	71.49
1995	121121	10.55	35174	29.04	85947	70.96
1996	122389	10.42	37304	30.48	85085	69.52
1997	123626	10.06	39449	31.91	84177	68.09
1998	124761	9.14	41608	33.35	83153	66.65
1999	125786	8.18	43748	34.78	82038	65.22
2000	126743	7.58	45906	36.22	80837	63.78
2001	127627	6.95	48064	37.66	79563	62.34
2002	128453	6.45	50212	39.09	78241	60.91
2003	129227	6.01	52376	40.53	76851	59.47
2004	129988	5.87	54283	41.76	75705	58.24
2005	130756	5.89	56212	42.99	74544	57.01
2006	131448	5.28	57706	43.90	73742	56.10
2007	132129	5.17	59379	44.94	72750	55.06
2008	132802	5.08	60667	45.68	72135	54.32
2009	133474	5.05	62186	46.59	71288	53.41

Note: 1) Natural growth rate refers to the ratio of natural increase in population (number of births minus number of deaths) in a certain period of time (usually a year) to the average population (or mid-period population) of the same period, expressed in ‰. The following formula is applied:

$$\text{Natural Growth Rate of Population} = \frac{\text{Number of Births} - \text{Number of Deaths}}{\text{Annual Average Population}} \times 1000‰$$

Natural Growth Rate = Birth Rate-Death Rate

2) Data in this table do not include the population of Hong Kong Special Administrative Region (SAR), Macao SAR and Taiwan Province.

Source: China Statistical Yearbook 2010.

Another change in population structure is relevant to the age composition. With the practice of family planning program and economic growth, rapidly decreasing fertility rate together with lengthening life expectancy (see Figure 4.1) led to the demographic transitions and thus reshaped the age structure in China. Changes in age composition of the population from 1982 to 2009 are presented in Figure 4.2. The number of children under 14 years old tended to decline significantly in the 2000s. Compared with 1982, the number of children in 2009 experienced a decrease of 95.8 million reaching 246.6 million, and the ratio of children to the total population declined from 33.5% to 18.5%. In contrast, the ratio of persons 65 and over to the total population increased continuously during the same period, exceeding 7% from 2000 and reaching 8.5% in 2009. Although the population aged 15-64, namely the working-age population also increased about 349 million to 975 million with a proportion rise from 62% to 73%, the old-age dependency ratio[21] had still undergone a sustained increase from 7.98 in 1982 to 11.60 in 2009; this means every 100 working-age population needed to support about only eight older persons in 1982, whereas this number increased to nearly 12 by 2009. Considering the different taste and preferences among persons from different age groups, such changes in age composition inevitably influence food consumption.

[21] Old-age dependency ratio refers to the ratio of the elderly population to the working-age population, express in %. It describes the number of the elderly population that every 100 people at working ages will take care of. Old-age dependency ratio is one of the indicators reflecting the social implication of population ageing from the economic perspective. It is worth noting here that the working-age population in China's official statistics is defined as the population aged 15-64 as same as the UN but different from FAO which defined it as the population aged 20-64. The old-age dependency ratio is calculated with the following formula: $ODR=P_{65}^{+}/P_{15\text{-}64} \times 100\%$, where ODR is the old dependency ratio, P_{65+} is the elderly population aged 65 and over, and $P_{15\text{-}64}$ is the working-age population aged 15-64.

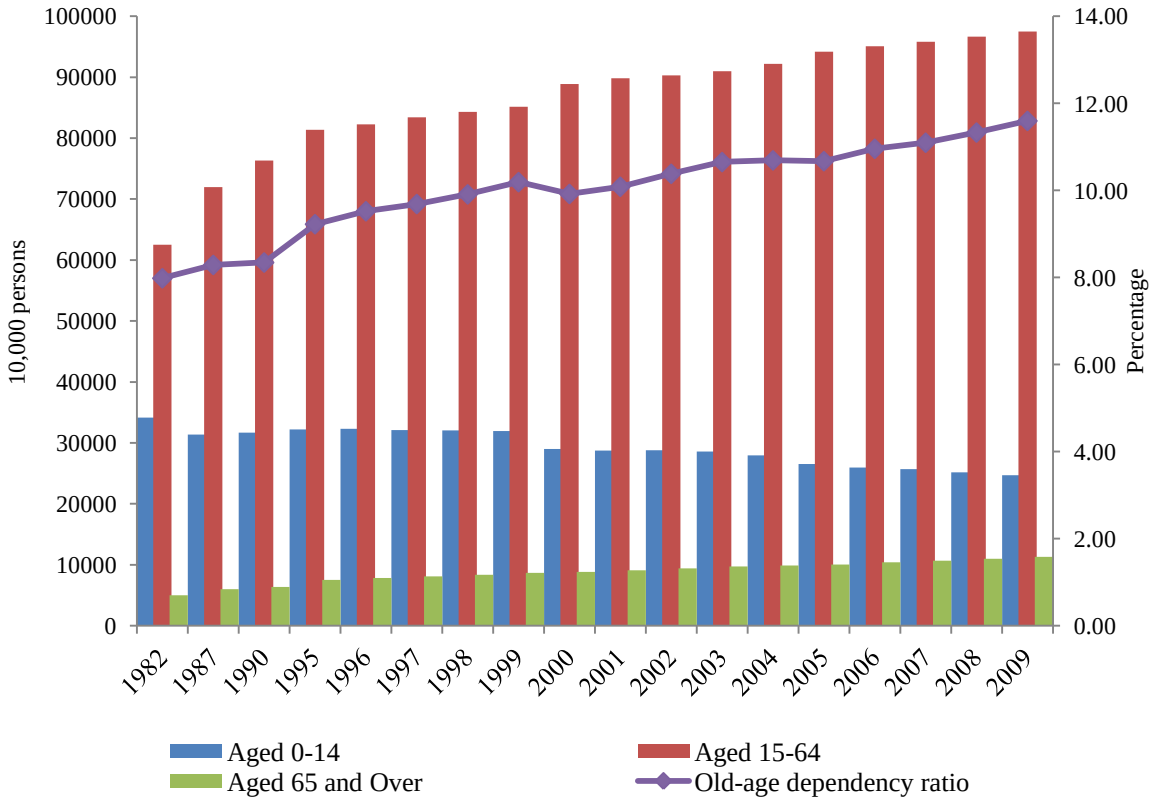

Figure 4.2 Age composition of populaiton, 1982-2009

Source: China Statistical Yearbook 2010.

4.1.2 Prospect of China's population

China's total population is projected to have a further increase in the coming years. According to projections by the United Nations (UN) with five-year intervals, the population will continue the positive increase by 2010-2015, 2020-2025 and 2040-2045 under the low, medium (constant) and high fertility assumptions, respectively (Figure 4.3). Thus the total population will peak by 2015, 2030 and 2045 under those same assumptions respectively. There are great variations among these projections except for the close projections between the medium and constant fertility assumptions. As Figure 4.4 shows, by 2030, the total population is predicted to reach 1.39 billion for the medium variant, about 74 million more (less) than that for the low (high) variant. By 2050, negative growth, although differs in the degree, is found in all fertility assumptions. A number of nearly 1.3 billion is projected in the case of medium variant in 2050, and the disparities with the low and high variants are expected to enlarge to about 165 and 184 million, respectively.

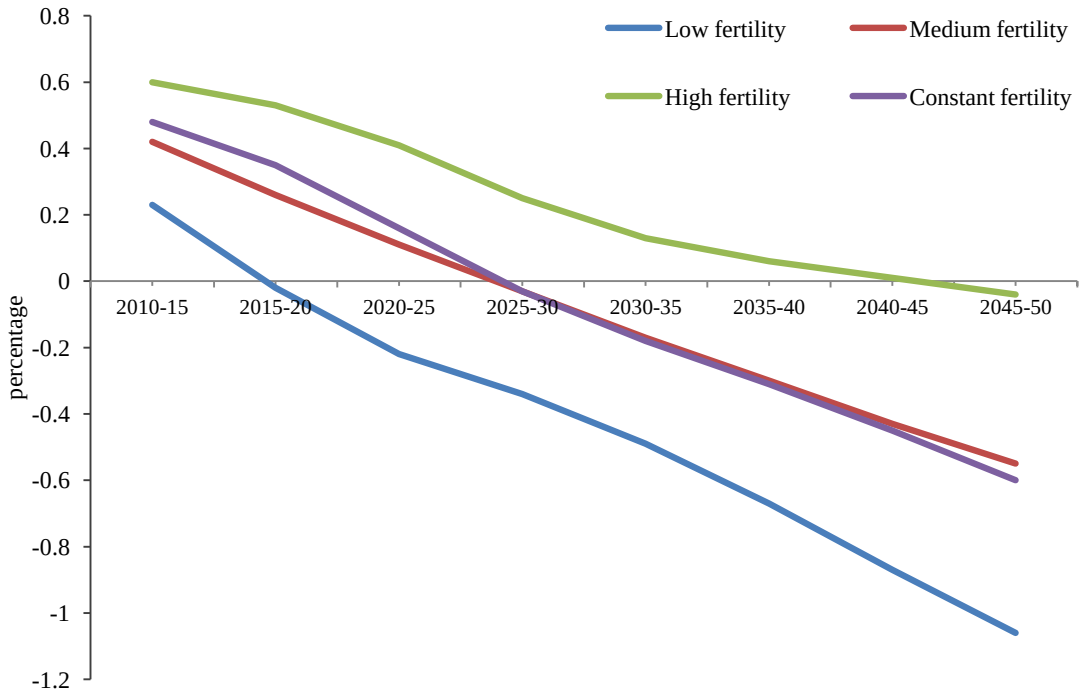

Figure 4.3 Projected changes in average annual growth rate of China's population, 2010-2050

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm.

On the other hand, population changes in the regional distribution are also expected to continue. According to the UN projections presented in Table 4.3, urbanization is expected to proceed further in the next four decades, increasing from 47% in 2010 to 73.2% in 2050. Urban residents are projected to increase in a descending speed during the same period and exceed rural residents in the number by 2015. In contrast, the rural population is expected to decrease at an accelerating speed, reaching about 557and 379 million by 2030 and 2050, respectively.

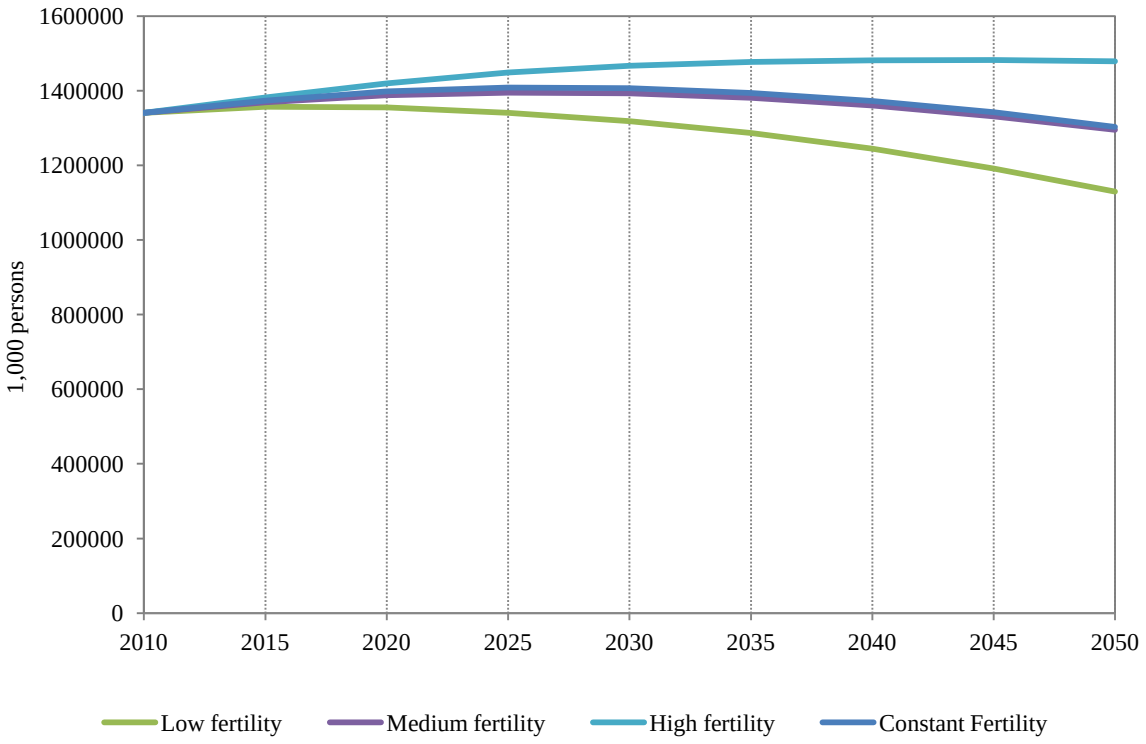

Figure 4.4 China's Population projections by different fertility assumptions, 2010-2050

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm.

Table 4.3 Projections on China's urban and rural population by UN, 2010-2050

Year	Population (thousands)		Urbanization rate (%)	Period	Annual growth rate (%)	
	Urban	Rural			Urban	Rural
2010	635839	718307	47			
2015	713091	682907	51.1	2010-2015	2.29	-1.01
2020	786761	644394	55	2015-2020	1.97	-1.16
2025	851430	601710	58.6	2020-2025	1.58	-1.37
2030	905449	557019	61.9	2025-2030	1.23	-1.54
2035	949764	512587	64.9	2030-2035	0.96	-1.66
2040	987162	467893	67.8	2035-2040	0.77	-1.82
2045	1016967	423322	70.6	2040-2045	0.59	-2
2050	1037695	379350	73.2	2045-2050	0.4	-2.19

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision and World Urbanization Prospects: The 2009 Revision, http://esa.un.org/wup2009/unup/

With respect to the future changes in age composition, the proportion of persons aged 65 or over is expected to continue increasing over the next four decades due to the advance of population ageing. According to the UN's projections (Figure 4.5), the older persons are estimated to account for about 16.5% in the total population in 2030, up from the level of merely 8.2% in 2010. By 2050, the percentage aged 65 or over will further increasing to about 25.6%, meaning there will be one older person in every 4 persons then. In contrast, the proportions of children and working-age persons are expected to decrease from about 20% and 72% in 2010 to 13% and 61% in 2050, respectively.

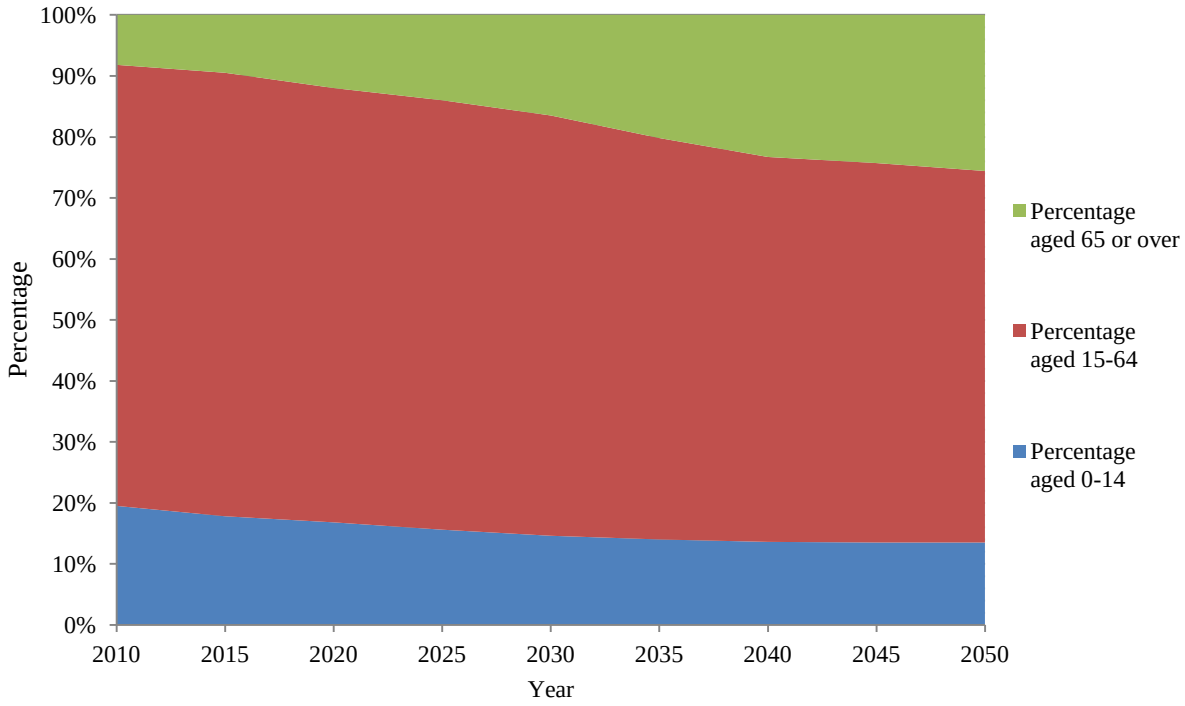

Figure 4.5 Projections on age composition in China under the medium fertility assumption , 2010-2050

Source: calculated according to the UN's World Population Prospects: The 2010 Revision. http://esa.un.org/unpd/wpp/index.htm.

These changes in total population, regional distribution and age composition in the coming years will inevitably reshape the current dietary pattern and lead to changes in food and thus grain consumption.

4.2 Grain supply in China

On the supply side, grains are supposed to be determined by the area of arable land and the yield.

There are about 110 million ha of arable land available in China by 2009, accounting for 11.79% of the total land area according to FAOSTAT. From 1961 to 2009, the arable land area experienced a slight decrease until the early 1980s, and then rebounded upward significantly in the late 1980s before entering another decreasing period (Figure 4.6). Although the area had an increase in 2004, the declining tendency is not stopped afterwards. The main economic cause is relevant to the rapid urbanization throughout the country since the reform in the late 1970s. Besides, desertification, land degradation and environmental protection also lead to the decrease in arable land. According to *China Land and Resources Report*, among the reasons leading to decrease in arable land, construction contributed most in 1998 by accounting for about 31%. From 1998 to 2006, practice of large-scale environmental protection, primarily in the form of "Grain for Green" Project by turning the low-yielding farmland back into forests and pasture, constituted the largest share varying from 47% (in 1999) to 77% (in 2003) among various reasons for decreases in arable land. Since 2007, construction use has become the largest factor leading to land decreases again.

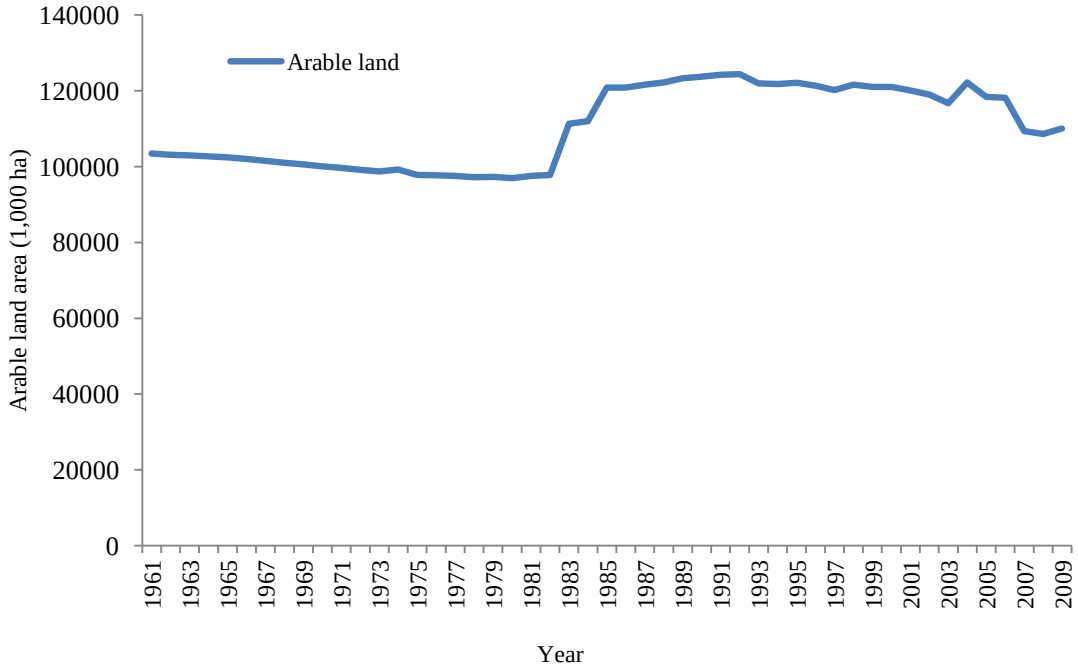

Figure 4.6 Changes in area of arable land in China, 1961-2009

Source: FAOSTAT

Table 4.4 Yields of major grain items in China and the US

Unit: tonne / ha

Year	Corn		Rice, Milled		Wheat	
	China	US	China	US	China	US
1980/1981	3.08	5.71	4.13	4.95	1.89	2.25
1985/1986	3.61	7.41	5.26	6.07	2.94	2.52
1990/1991	4.52	7.44	5.73	6.20	3.19	2.66
1991/1992	4.58	6.82	5.64	6.42	3.10	2.30
1992/1993	4.53	8.25	5.80	6.43	3.33	2.64
1993/1994	4.96	6.32	5.85	6.18	3.52	2.57
1994/1995	4.69	8.70	5.83	6.68	3.43	2.53
1995/1996	4.92	7.12	6.02	6.30	3.54	2.41
1996/1997	5.20	7.98	6.21	6.86	3.73	2.44
1997/1998	4.39	7.95	6.32	6.61	4.10	2.66
1998/1999	5.27	8.44	6.37	6.35	3.69	2.90
1999/2000	4.94	8.40	6.34	6.58	3.95	2.87
2000/2001	4.60	8.59	6.27	7.04	3.74	2.82
2001/2002	4.70	8.67	6.16	7.28	3.81	2.70
2002/2003	4.92	8.12	6.19	7.37	3.78	2.36
2003/2004	4.81	8.92	6.06	7.48	3.93	2.97
2004/2005	5.12	10.06	6.31	7.83	4.25	2.90
2005/2006	5.29	9.29	6.26	7.43	4.28	2.82
2006/2007	5.33	9.36	6.28	7.73	4.59	2.60
2007/2008	5.17	9.46	6.43	8.09	4.61	2.70
2008/2009	5.56	9.66	6.56	7.68	4.76	3.02
2009/2010	5.26	10.34	6.59	7.94	4.74	2.99
2010/2011	5.45	9.59	6.56	7.54	4.74	3.12
2011/2012	5.74	9.21	6.70	8.03	4.87	2.94

Source: Production, Supply and Distribution Online database, Foreign Agricultural service, USDA.

Another factor determining the grain supply is yield, which is decided primarily by technological conditions. Table 4.4 presents yields in China and the US of major cereals including corn, wheat and rice (milled base) from 1980 until now. Over the last 3 decades, there had been substantial improvement in yields of major cereals. The yield of corn is expected to increase by almost 90% from 3.08 tonnes per ha in 1980/1981 to 5.74 in 2011/2012 as compared with about 62% and 158% for that of rice and wheat. Despite this, the yields still show great disparities with those in

US. Except the higher yield for wheat in China, productivity of corn and rice is much lower than in US. Particularly with respect to corn, the yield in China is expected to reach 5.74 tonnes per ha in 2011/2012, merely 62% of the US level. These yield gaps, although showing differences between China and the US in agricultural productivity, pose potential and possibilities for further improvement in China's crop production with the development and introduction of advanced technologies.

4.3 The model

In this section, a supply-demand model of feed grains is developed to analyze the impacts of China's demand of feed grains on the global grain market. Since feed corn accounts for about 90% in the total consumption of feed grain, this model takes feed corn as the representative of feed grains.

4.3.1 Framework, Method and Data

The framework of the model is presented in Figure 4.7.

To analyze the impacts of China's feed corn demand on the world market, the world demand for feed corns are divided into two parts: China's domestic demand for feed corns and the world demand for feed corns excluding China. The function of world demand for feed corns is expressed as:

D_FC = D_FC_CHN + D_FC_OTHERS (1)

Where D_FC means world demand for feed corns;
D_FC_CHN denotes China's domestic demand for feed corns;
and D_FC_OTHERS denotes world demand for feed corns excluding China.

The former, China's domestic demand for feed corns, is defined as a function of the price of corn and the demand for livestock products. Taking 2006 as the base year, the function is expressed as follows, where the coefficients -0.1520, 0.2997 and 0.3004 are taken from Koizumi (2007).

D_FC_CHN /D_FC_CHN (2006) = (P_C / P_C (2006)) ^ (-0.1520) * (D_B_CHN / D_B_CHN (2006)) ^0.2997 * (D_P_CHN /D_P_CHN (2006)) ^ 0.3004 (2)

[22]**D_FC_CHN = (P_C / 4.028)^(-0.1520) * (D_B_CHN / 5858609.03)^0.2997 * (D_P_CHN / 47328658.83)^0.3004 * 97572331* (2')

Where P_C is the price (dollar/ bushel) of No.2 yellow corn, US F.O.B Gulf ports;

D_B_CHN denotes China's domestic food supply of beef;

and D_P_CHN denotes China's domestic food supply of pork.

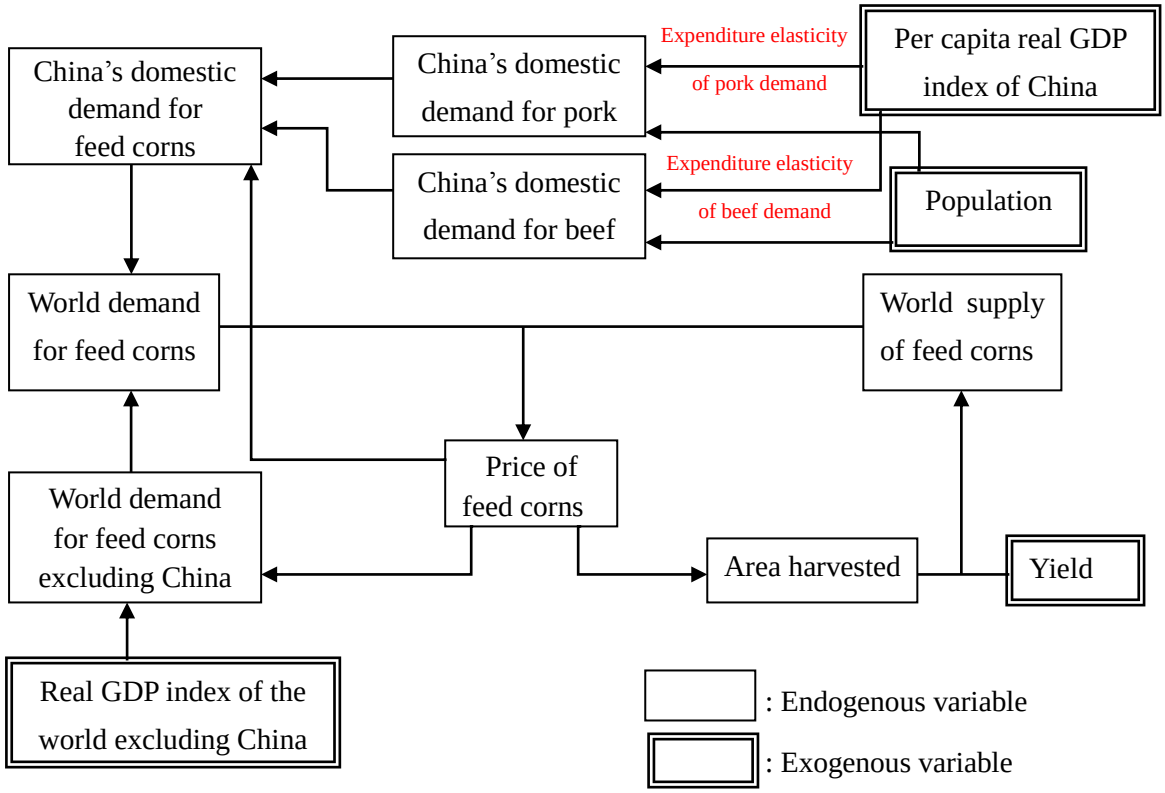

Figure 4.7 Model Framework

With respect to China's demand for beef (pork), they are estimated as functions of per capita real GDP index of China, population and expenditure elasticity of beef (pork).

(D_B_CHN /N_CHN)/ (D_B_CHN (2006) /N_CHN (2006)) = (GDP_INDEX_I / (GDP_INDEX_I (2006)) ^ E_B (3)

[22] * * The function in italic characters is the result of substituting the indexes for actual numbers.

(D_P _CHN/N_CHN) / (D_P_CHN (2006)/N_CHN (2006)) = (GDP_INDEX_I/ (GDP_INDEX_I (2006)) ^E_P (4)

***D_B_CHN = (GDP_INDEX_I / 994.7) ^E_B * (N_CHN / 1314261724) * 5858609.03* (3')

***D_P_CHN = (GDP_INDEX_I / 994.7) ^E_P * (N_CHN / 1314261724) * 47328658.83* (4')

Where N_CHN denotes China's population;

GDP_INDEX_I represents per capita GDP index of China (1978=100);

E_B denotes income elasticity of beef;

and E_P denotes income elasticity of pork.

As to the latter demand, i.e., world demand for feed corns excluding China, it is estimated originally using data of corn price and GDP index as follows:

D_FC_OTHERS= exp (16.3598-0.0631*LOG (P_C/CPI) + 0.5743*LOG (GDP_INDEX_OTHERS))
(95.4374) (-2.9913) (14.5517)

(5)

R^2=0.9663, n=18, DW=2.1280

Where CPI means world consumer price index, 2005=100;

and GDP_INDEX_OTHERS denotes the real GDP Index for the world excluding China.

On the supply side, world supply of feed corn is expressed as the function of the price of corn. Since this model is developed under the assumption of no improvement in yield, the supply of corn is determined only by area harvested. The parameter of price elasticity for world feed corn supply (0.2139) is calculated by taking the weighted average on parameters of eight major corn producing countries (regions) and the other areas in the model of Koizumi (2007)[23]. The eight major corn producing countries (regions), i.e., China, US, Argentina, Brazil, South Africa, Mexico, Canada, and EU, account for more than 80% of the corn production . The average corn production shares during 2007-2009[24] in total world production for these countries (regions) are used as

[23] See Table D.2 in Appendix D for the specific parameters for eight major corn producing countries (regions) and the other areas in the model of Koizumi (2007).

[24] The average corn production shares are calculated according to the corn production data from FAOSTAT as follows: China, 19.81%; US, 39.92%, Argentina, 2.34%; Brazil, 6.66%, South Africa, 1.30%; Mexico,

weights in calculating the price elasticity of world feed corn supply. Thus, the function for the world supply of feed corns is described below:

S_FC/S_FC (2006) = (P_C/P_C (2006)) ^0.2139 (6)

Where S_FC denotes the world supply of feed corns.

***S_FC = 437112881 * (P_C / 4.028) ^0.2139* (6')

Finally, the Supply-demand balance equation is expressed as follows:

P_C = P_C * (D_FC / S_FC) (7)

In order to make projection using this model, it is needed to decide on the exogenous variables in the forecast period. There are two exogenous variables in this model, i.e., per capita GDP index of China and real GDP index for the world excluding China. The function forms of these two variables are estimated using the historical data from 1980 to 2009 as follows. In the forecast period, they are assumed to follow the same function.

GDP_INDEX_I= 1.096*GDP_INDEX_I (-1) (8)

GDP_INDEX_OTHERS=1.030*GDP_INDEX_OTHERS (-1) (9)

The data used in this model are mostly from several international organizations like FAO, the International Monetary Fund (IMF), the OECD and the World Bank. Table 4.5 shows the main data for selected years.

Data relevant to demand are collected from FAOSTAT, including the world and China's demand for feed corns and China's domestic demand for beef and pork during the period 1980-2007[25].

As to the corn price data, prices of the No 2 yellow corn US F.O.B Gulf ports are employed from the OECD database as the world corn price. The world consumer price index (CPI) data, are

---

2.79%, Canada, 1.31%; EU, 6.95%; and the other areas, 18.91%. For the specific calculation, see Table D.2 in Appendix D.

[25] See Table D.1 in Appendix D for the detailed data from 1980 to 2007.

collected from the World Data Bank, a database from the World Bank.

As mentioned above, function (8) is estimated using China's historical per capita real GDP index data (1978=100) covering 1980 to 2009 from China's Statistical Yearbook 2010.

The real GDP index for the world excluding China from 1980 to 2009 is calculated according to the world and China's GDP growth rate and the percentage of China's GDP in the world, which are reported in IMF's World Economic Outlook database in 2011[26].

For the population data in China, either historical data or the future projections by 2030 are taken from the *World Population Prospects* by the United Nations[27]. Since the UN only gives the population projections by an interval of five years, the populations for the year between the intervals are calculated according to the population of the beginning year and the average annual growth rate during the 5 years.

Table 4.5 Demand for feed corn and livestock products and price data, 1980-2007 (selected years)

Year	Demand for feed corn (tonnes)		Corn price (USD/bushel)	CPI-world (2005=100)	China's domestic beef demand		China's domestic pork demand	
	World	China			Total (tonnes)	Per capita (kg)	Total (tonnes)	Per capita (kg)
1980	300497739	54442847	3.59	17.36	359784.07	0.37	12015596.74	12.22
1985	286639501	46763648	2.52	31.13	522704.19	0.49	17345995.54	16.42
1990	302774537	57973510	2.67	45.55	1180803.66	1.03	23695898.23	20.69
1995	360171912	87636590	4.30	64.77	3595386.46	2.96	32918070.18	27.12
2000	405950591	93931080	2.26	84.06	5251935.94	4.14	41047127.16	32.34
2005	453475613	99469911	2.69	100.00	5771592.19	4.41	46403824.15	35.49
2007	463053345	100332225	5.53	109.71	6236053.7	4.72	44017055.04	33.32

Source: FAOSTAT, OECD database, World data bank (the World Bank).

[26] See Table D.3 in Appendix D.

[27] See Table D.4 in Appendix D.

4.3.2 Assumptions

I Saturation of the expenditure elasticities of livestock and aquatic products in China

The expenditure elasticities of livestock and aquatic products such as pork, beef, poultry and seafood, had saturated by 2006 and shall be constant in the years ahead.

II Synchronous changes in the corn price between China's domestic and the world market

It is assumed that the corn price in China's domestic market after conversion to the US dollars shall keep pace with that in global market. Therefore, the former is replaced by the corn price in global market.

III Constant yield of corns during the projection period

The third assumption is relevant to the technological factors. Technological innovations or introductions are not considered in this model so that the increase in corn production only comes from the increase of harvest area.

IV Population growth in China under the medium-fertility assumption

The population size in the projection period is calculated according to the UN's medium-fertility estimates. Since the UN only estimates the average growth rate for every five years, the population for the years among is assumed to change at the same growth rates.

V Static expectations on the economic growth rates

The economic growth rates for China and other areas are projected to follow the historical path in the projection period.

4.3.3 Modeling scenarios

As is emphasized in the introduction, this study is not aiming at projecting specific grain self-sufficiency rate, but endeavors to simulate the possible impacts of China's grain demand on the price and demand in global grain market under three scenarios of different estimates for

livestock expenditure elasticities in China. The three scenarios, which originate in Chapter 3, are composed of the 2006 DLF estimates[28]of expenditure elasticities of livestock products for both urban and rural China, and the elasticities the OECD used for China as a whole in the AGLINK-COSIMO model (see Table 4.6).

Table 4.6 Scenarios

Scenarios	Expenditure elasticity of beef (E_B)	Expenditure elasticity of pork (E_P)
Baseline (E_Urban)	=E_B_Urban, Jiang's 2006 DLF estimate for expenditure elasticity of beef consumption in urban China using 7- income-group data, E_B_Uran (2006) =0.276	=E_P_Urban, Jiang's 2006 DLF estimate for expenditure elasticity of pork consumption in urban China using 7-income-group data, E_B_Urban (2006)=0.157
Scenario 1 (E_Rural)	=E_B_Rural, Jiang's 2006 DLF estimate for expenditure elasticity of beef consumption in rural China using 5-income-group data, E_B_Rural(2006) =0.647	=E_P_Rural, Jiang's 2006 DLF estimate for expenditure elasticity of pork consumption in rural China using 5-income-group data, E_P_Rural (2006) =0.278
Scenario 2 (E_OECD)	= E_B_OECD, estimate of beef expenditure elasticity used by the OECD for China food projections, E_B_OECD =1.593	=E_P_OECD, estimate of pork expenditure elasticity used by the OECD for China food projections, E_P_OECD =0.709

Source: Author's estimates and AGLINK-COSIMO model, 2009 version database.

As is presented in 4.3.2, an important assumption in this model is that the expenditure elasticities of livestock and aquatic products such as pork, beef, poultry and seafood, had saturated by 2006 and will keep constant in the years ahead. That is why the 2006 estimates of expenditure

[28] For the estimates of expenditure elasticities for livestock products in rural China, the 2006 DLF estimates using 5- income-group data are used in this model. Compared with the estimation results of the 20 income-group data, the 5-income-group data are more detailed in that they provide specific information on consumptions of various meat items including pork, beef and mutton (beef and mutton as a sum for 2002, 2003, 2004, and 2007; and beef and mutton separately for 2006) rather than total consumption of meat as a whole (see Appendix B for the detailed data). Therefore, as can be seen in Table 3.6 and Table 3.7, expenditure elasticities of pork, beef and mutton are presented respectively in the 5-income-group estimation in 2006, whereas expenditure elasticities of meat are reported as a whole in the estimation with 20-income-group data.

elasticites are used here. Another realistic reason is because the latest and specific expenditure elasticity of beef in rural China is only available in 2006 from the DLF analysis.

As is discussed in the previous chapter, since the OECD estimates are significantly larger than the estimates—even the estimates for rural China in this study—, there are possibilities of overestimation when they are used for projections on China's grain demand. This study deals with China as a whole and assumes the above urban, rural and OECD estimates as the livestock expenditure elasticities for the overall China. By comparing the different impacts of China's grain demand on the world market under the three scenarios, China is considered feasible to achieve a sustained self-sufficiency in feed grains if the world grain price in scenarios of urban and rural estimates does not increase as high as in that of OECD estimates.

Finally, the projection period is set from 2008 to 2030.

4.3.4 Projection results

A comparison of simulation results for the baseline and the other two scenarios are presented in Table 4.7, and the specific results for every scenario are reported separately in Table 4.8, 4.9 and 4.10.

1. Baseline projection results

Under the baseline projection, per capita annual beef and pork consumptions in China are estimated using the estimates of expenditure elasticities for urban areas as shown in Table 4.6.

As Table 4.7 and Table 4.8 shows, compared with 2007, the average consumptions of beef and pork are projected to increase by about 74% and 53% respectively to 8.23 and 51.04 kg by 2030. Although consumption of beef is predicted to grow at a higher speed, pork has overwhelming advantage over beef in the absolute quantity.

Consequently, China's domestic demand for feed corns is predicted to have a rise of nearly 5.6 million tonnes, but its share in the whole world demand will almost continue decreasing slowly to about 17%. From 2007 to 2030, the world demand for feed corns are projected to increase by about 33%, whereas China's domestic demand is expected to see a moderate growth of less than 6% (Table 4.7).

Table 4.7 Comparison of the simulation results

Item		2007	Baseline (E_Urban)		Scenario 1 (E_Rural)		Scenario 2 (E_OECD)	
			2030	Growth rate (%)	2030	Growth rate (%)	2030	Growth rate (%)
Corn price (USD/bushel)		5.53	19.70	256.24	24.51	343.22	61.28	1008.14
World demand (tonnes)	(A)	463053345	613862400	32.57	643198800	38.90	782472800	68.98
China's domestic demand (tonnes)	(B)	100332225	105924200	5.57	142203600	41.73	309608000	208.58
Percentage (%)	(B/A*100)	21.67	17.26	-20.35	22.11	2.03	39.57	82.60
Per capita annual beef consumption (kg/capita/year)		4.72	8.23	74.36	18.76	297.46	153.39	3149.79
Per capita annual pork consumption (kg/capita/year)		33.32	51.04	53.18	66.78	100.42	173.93	422.00

Source: FAOSTAT, OECD database, World data bank (the World Bank), and author's estimates.

Table 4.8 Baseline (E_Urban) projection results

Year	Corn price (USD/bushel)	World demand (tonnes) (A)	China's domestic demand (tonnes) (B)	Percentage (%) (B/A*100)	Per capita annual beef consumption (kg/capita/year)	Per capita annual pork consumption (kg/capita/year)
2008	5.19	461404600	97131480	21.05	4.73	37.24
2009	5.14	460553300	98602930	21.41	4.84	37.73
2010	5.48	466933000	99117780	21.23	4.96	38.27
2011	5.85	473378700	99582580	21.04	5.09	38.83
2012	6.23	479921000	100048400	20.85	5.22	39.39
2013	6.65	486561300	100515400	20.66	5.35	39.96
2014	7.09	493301200	100983300	20.47	5.49	40.54
2015	7.56	500142300	101452500	20.28	5.63	41.13
2016	8.06	507015400	101835200	20.09	5.77	41.72
2017	8.59	513992000	102218000	19.89	5.92	42.33
2018	9.16	521073900	102601000	19.69	6.07	42.94
2019	9.76	528262700	102984100	19.49	6.23	43.57
2020	10.41	535565000	103373400	19.30	6.39	44.20
2021	11.10	542904900	103672900	19.10	6.55	44.84
2022	11.83	550356300	103971700	18.89	6.72	45.49
2023	12.61	557920900	104270000	18.69	6.89	46.15
2024	13.44	565600500	104567700	18.49	7.07	46.82
2025	14.32	573390900	104857200	18.29	7.25	47.49
2026	15.26	581241700	105073600	18.08	7.44	48.18
2027	16.27	589212600	105288900	17.87	7.63	48.88
2028	17.34	597305500	105503100	17.66	7.82	49.59
2029	18.48	605522500	105716000	17.46	8.02	50.31
2030	19.70	613862400	105924200	17.26	8.23	51.04

The price in balance will rise by about 250% with the expansion of demand compared to 2007. However, considering its declining percentage in the world’s feed-corn demand, China is seldom regarded as the major driving forces for this rise on the price.

2. Projection results of scenario 1

Under the scenario 1, per capita annual beef and pork consumptions in China are estimated using

the estimates of expenditure elasticities for rural areas.

Table 4.9 presents the projection results of scenario 1. The average annual consumption of beef is projected to increase by nearly 3 times to 18.76 kg per capita by 2030, and the consumption of pork is expected to double as compared with 2007.

Table 4.9 Projection results of scenario 1 (E_Rural)

Year	Corn price (USD/bushel)	World demand (tonnes) (A)	China's domestic demand (tonnes) (B)	Percentage (%) (B/A*100)	Per capita annual beef consumption (kg/capita/year)	Per capita annual pork consumption (kg/capita/year)
2008	5.31	463653300	99901900	21.55	5.12	38.22
2009	5.31	463725000	102506200	22.10	5.40	39.10
2010	5.72	471134300	104289100	22.14	5.73	40.11
2011	6.16	478630500	106048300	22.16	6.08	41.15
2012	6.63	486246100	107837100	22.18	6.45	42.21
2013	7.14	493983000	109656100	22.20	6.84	43.30
2014	7.68	501843100	111505800	22.22	7.26	44.42
2015	8.27	509828400	113386800	22.24	7.71	45.56
2016	8.90	517861300	115201600	22.25	8.18	46.74
2017	9.57	526020700	117045500	22.25	8.68	47.94
2018	10.30	534308700	118918900	22.26	9.21	49.18
2019	11.08	542727400	120822300	22.26	9.77	50.45
2020	11.92	551284400	122763200	22.27	10.37	51.75
2021	12.81	559889700	124628900	22.26	11.00	53.09
2022	13.78	568629400	126522900	22.25	11.67	54.46
2023	14.81	577505600	128445700	22.24	12.39	55.87
2024	15.92	586520300	130397800	22.23	13.14	57.31
2025	17.12	595668200	132370100	22.22	13.95	58.79
2026	18.39	604885100	134281800	22.20	14.80	60.30
2027	19.76	614244800	136221100	22.18	15.70	61.86
2028	21.23	623749500	138188300	22.15	16.66	63.46
2029	22.81	633401400	140184000	22.13	17.68	65.10
2030	24.51	643198800	142203600	22.11	18.76	66.78

From 2007 to 2030, the world demand for feed corns is expected to see an increase of nearly 40%, whereas China’s domestic demand for feed corns is projected to grow by about 42% with an

increase of about 42 million tonnes. Despite the seemly large growth in quantity, China's share in the whole world demand is expected to keep constant at about 22%.

The price of corn is projected to rise by about 3.4 times to 24.51 USD/bushel, which is thought to be the result of the increase in the world demand. It is certain that China's increasing demand also contributes to the price rise. Nevertheless, the upward influences by China on the price of corn merely result from the increase in the absolute quantity rather than in the percentage in the world demand. Under this scenario, China in 2030 is projected to account for almost the same percentage in the world demand for feed corns compared with 2007. As a major player, the country will continue playing an important role in the world corn market, but its influences are hardly projected to increase in the next 20 years.

3. Projection results of scenario 2

Under the scenario 2, per capita annual beef and pork consumptions in China are estimated using the estimates of expenditure elasticities the OECD used in the AGLINK-COSIMO model.

As can be seen in Table 4.10, the average consumptions of beef and pork in China are expected to increase so sharply that lead to the substantial rise of corn price by 2030. With increases of more than 30 times and four times, per capita annual beef and pork consumption are projected to grow to the significantly high level of more than 150 kg and 170 kg respectively, overwhelmingly larger than any of the two previous simulation results.

As a result, China's domestic demand for feed corns is predicted to have a rise of more than 200 million tonnes, and its share in the whole world demand is also expected to rise rapidly from about 22% to nearly 40% at the same time. The increase is so fast and substantial that it is expected to inevitably drive the world corn price grow dramatically by more than 10 times compared with 2007.

Thus, under the scenario 2, China is expected to become more and more the major driving force of world corn price in the years ahead. By accounting for about 40% of the world feed-corn demand, any variation in China's domestic demand can lead to a substantial fluctuation on the price and demand in the world market. With the expanding share and increasing dependency in the world market, it is difficult for China to maintain self-sufficiency in feed corns.

Table 4.10 Projection results of scenario 2 (E_OECD)

Year	Corn price (USD/bushel)	World demand (tonnes) (A)	China's domestic demand (tonnes) (B)	Percentage (%) (B/A*100)	Per capita annual beef consumption (kg/capita/year)	Per capita annual pork consumption (kg/capita/year)
2008	5.67	470274400	108040500	22.97	6.27	41.91
2009	5.84	473244700	114183500	24.13	7.15	44.43
2010	6.49	484020200	120081800	24.81	8.27	47.41
2011	7.21	495091200	126204700	25.49	9.57	50.59
2012	8.02	506505300	132623100	26.18	11.07	53.99
2013	8.93	518275700	139350100	26.89	12.81	57.62
2014	9.95	530415900	146399400	27.60	14.83	61.49
2015	11.10	542940100	153785400	28.32	17.16	65.61
2016	12.38	555753700	161390700	29.04	19.86	70.02
2017	13.82	568970700	169350700	29.76	22.98	74.72
2018	15.43	582606500	177680700	30.50	26.59	79.74
2019	17.25	596676700	186396500	31.24	30.78	85.09
2020	19.31	611206600	195525300	31.99	35.61	90.81
2021	21.60	626067100	204909000	32.73	41.21	96.91
2022	24.19	641401400	214716400	33.48	47.69	103.41
2023	27.11	657227100	224965000	34.23	55.19	110.36
2024	30.41	673562300	235673200	34.99	63.87	117.77
2025	34.13	690412400	246843600	35.75	73.91	125.68
2026	38.31	707673900	258349800	36.51	85.53	134.12
2027	43.03	725490700	270359600	37.27	98.98	143.12
2028	48.37	743883200	282893200	38.03	114.54	152.73
2029	54.42	762872600	295971900	38.80	132.55	162.99
2030	61.28	782472800	309608000	39.57	153.39	173.93

Finally, the disparities among the three simulation results are shown clearly by the six figures below from 4.8 to 4.13. These figures demonstrate such disparities in corn price, world and China’s domestic demand for feed corns, China’s percentage in the total world demand, and per capita annual demand for beef and pork in China. It can be found that there are great disparities between scenario 2 and the other two scenarios, whereas the differences between the latter two simulations (urban elasticity estimates and rural elasticity estimates) are relatively small compared with the OECD estimates.

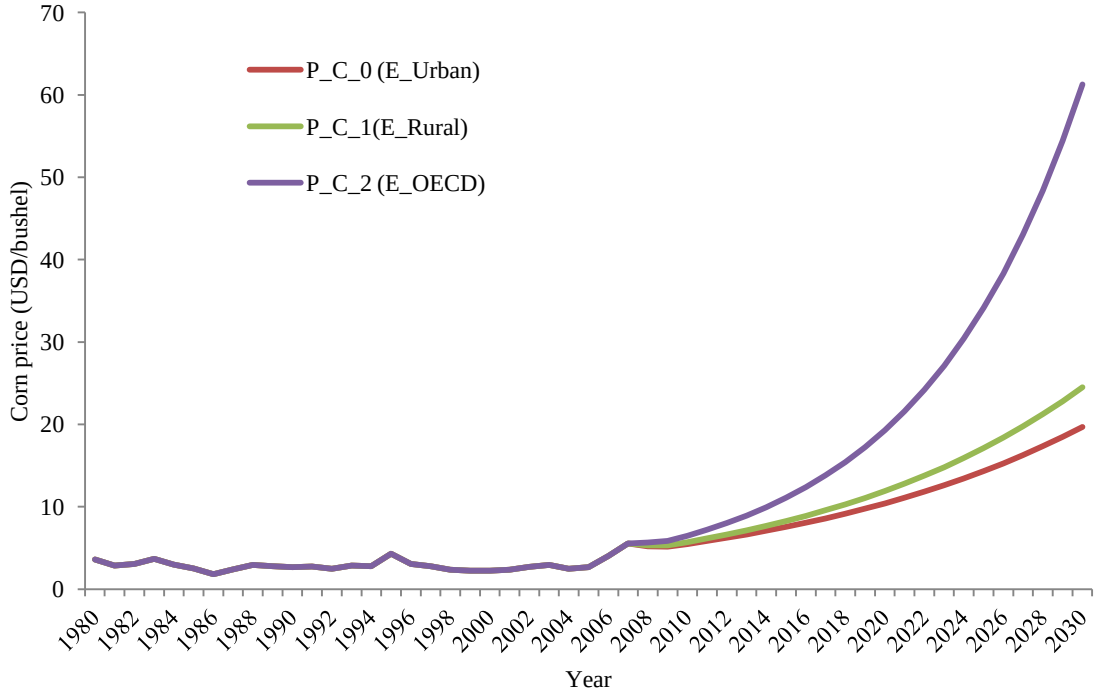

Figure 4.8 Corn price in the world market

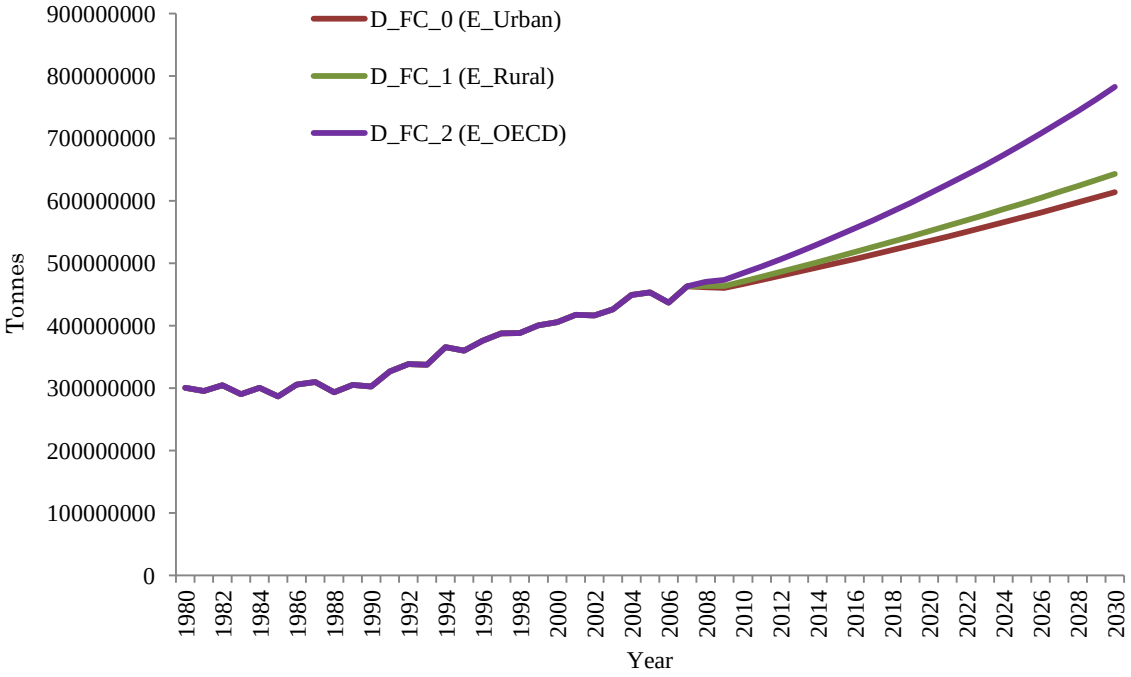

Figure 4.9 World demand for feed corns

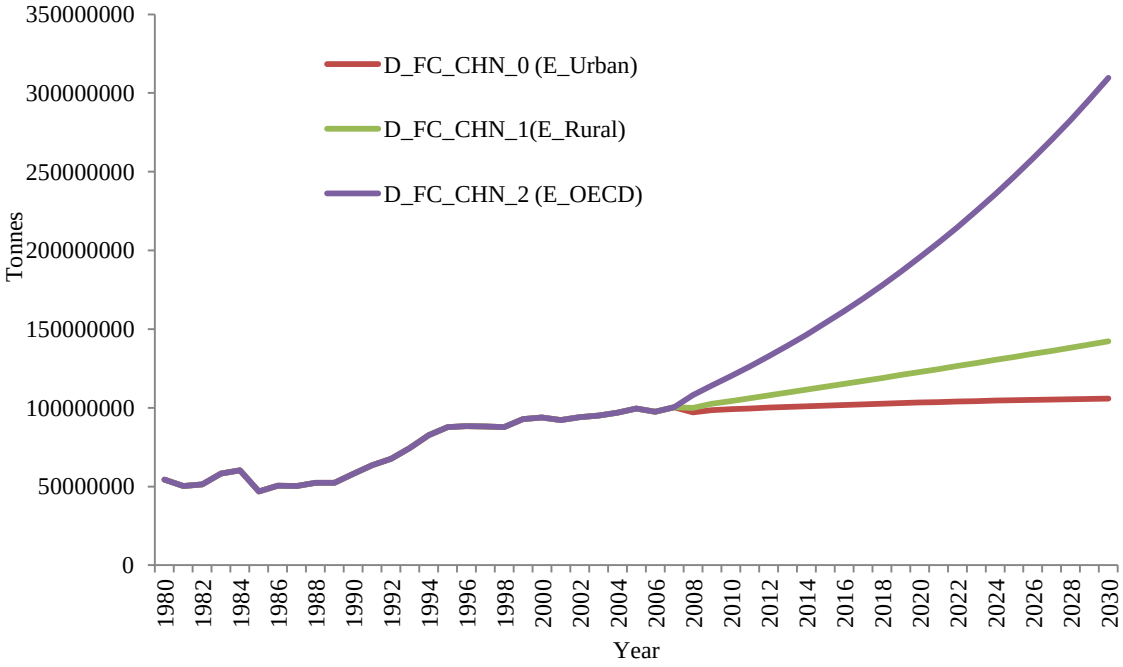

Figure 4.10 China's domestic demand for feed corns

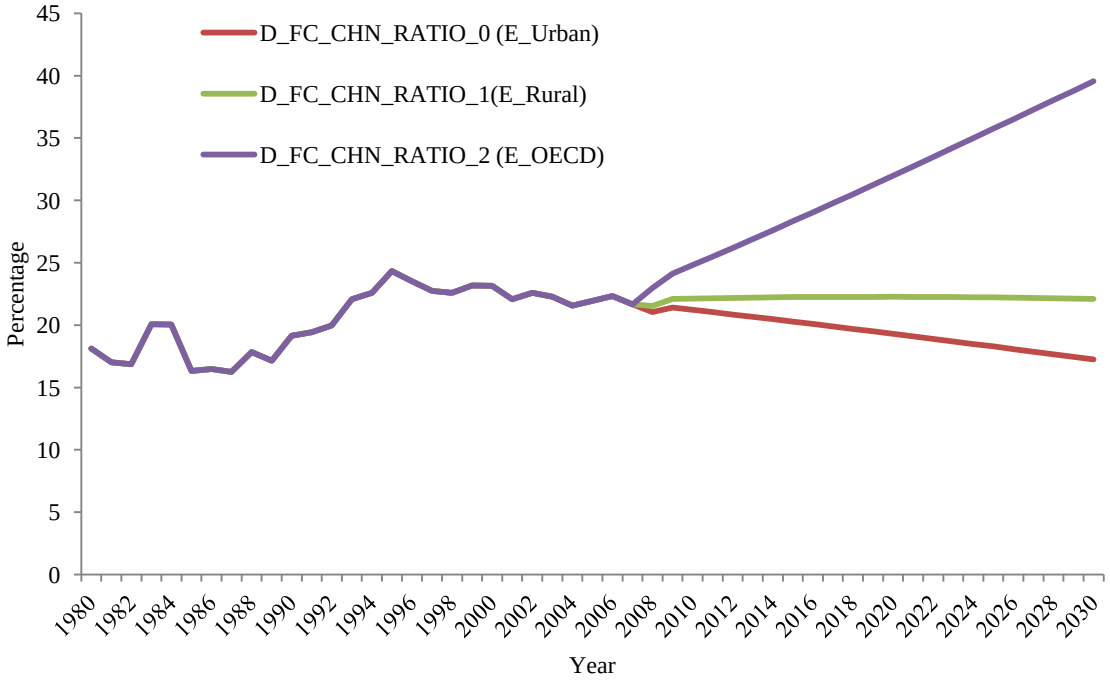

Figure 4.11 The ratio of China's domestic demand for feed corns to the world demand

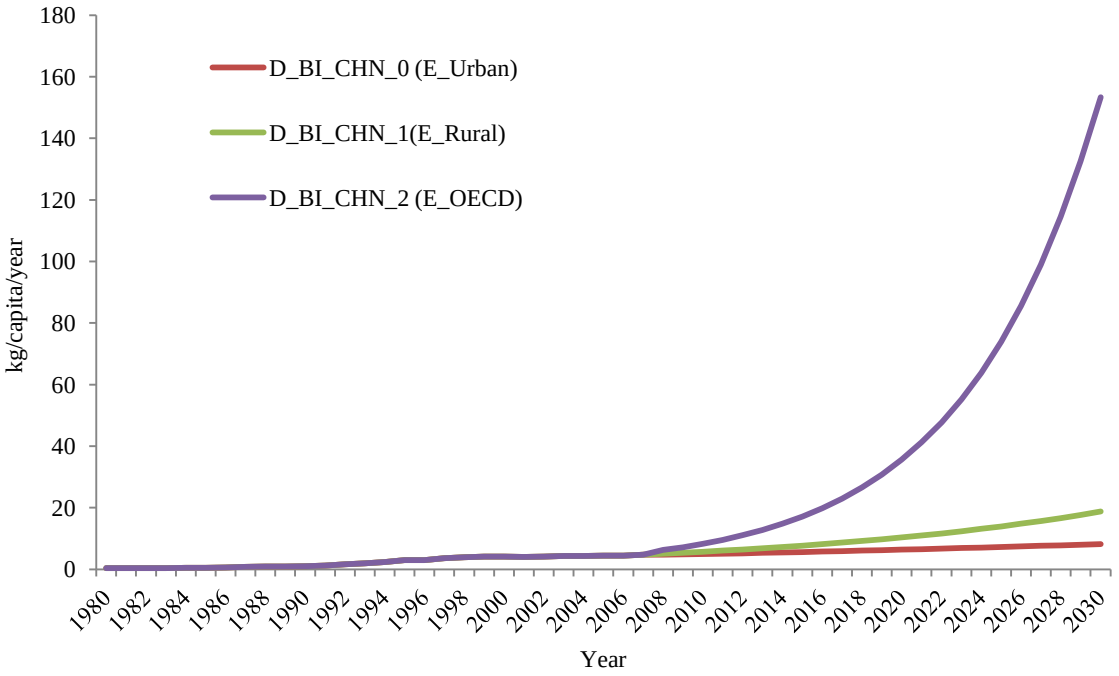

Figure 4.12 Per capita annual beef consumption in China

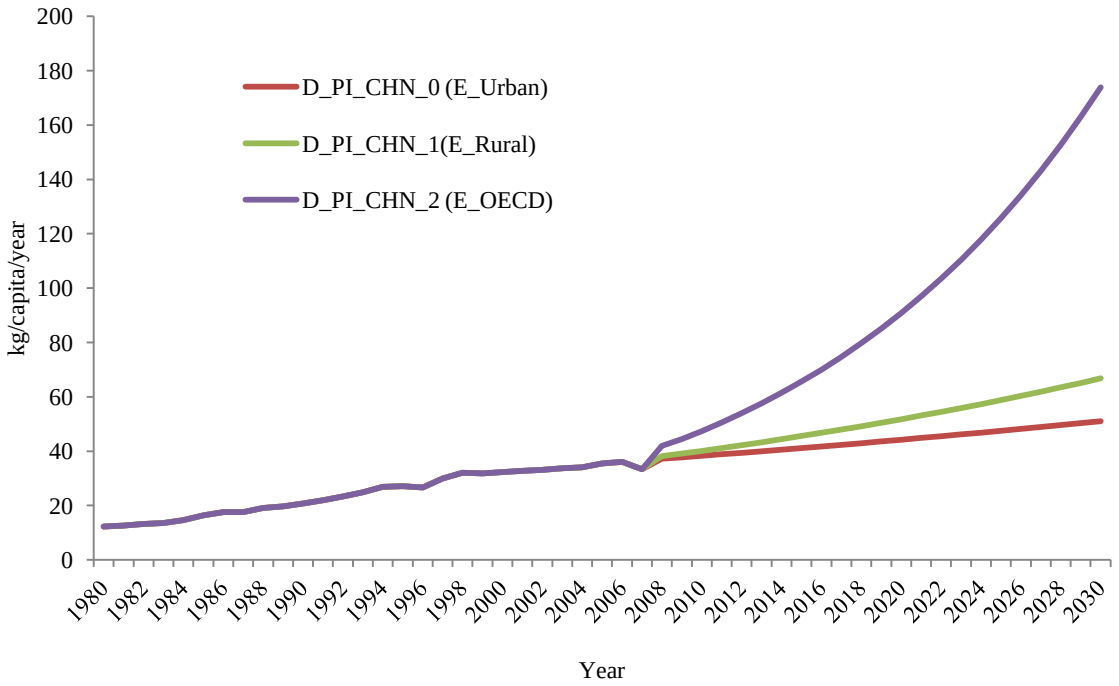

Figure 4.13 Per capita annual pork consumption in China

4.3.5 Implications of the model results

By establishing a partial-equilibrium model incorporating both the supply and demand sides of feed corns, the impacts of China's domestic feed-corn demand on the world market in the near future are simulated under three different scenarios.

These scenarios are divided by the varied estimates of expenditure elasticities for beef and pork. For the baseline and scenario 1, expenditure elasticities for urban and rural households estimated in this study are employed respectively. The future values of all the endogenous variables in this model, including the demand for animal products and feed corns and the corn price, are expected most probably to fall between the two projections. On the other hand, the expenditure elasticities which the OECD used for projections in the AGLINK-COSIMO model are employed as scenario 2. Since the OECD elasticities are much larger than the estimates in this study, it would mean the OECD may have overestimated China's feed grain demand if the estimates of this study possess a reasonable level of accuracy.

By comparing results among the above three simulations, the disparities between the OECD scenario and the other two scenarios are projected to be rather significant. Projections with the estimated expenditure elasticities for both urban and rural China in the present study yield a less rapid increase in China's feed grain demand and thus price of grains.

Under simulations with the estimates in this study, the per capita consumptions on beef and pork are projected to increase at a much slower pace than the scenario using OECD estimates. As a result, China is predicted to account for a constant or declining ratio rather than an increasing one in the world demand for feed corns. The corn price is therefore projected to rise comparatively moderately compared with the OECD scenario. Moreover, most of this rise is hardly considered as the result brought about by China since its influences on the world feed-corn market are expected to weaken or remain stable in the near future.

In this sense, it can be concluded according to this analysis that in all likelihood the OECD may have overestimated China's feed grain demand. In other words, under the estimates of expenditure elasticities in this study, China is expected to sustain its demand for grains without jeopardizing world grain's supply-demand balance and leading to a global price boom.

4.4 Policy proposals

According to the above model analyses, although China is expected to be faced with an continuously increasing demand for livestock products, the growth rate is relatively low compared with the OECD's estimates. Thus, China is predicted to account for a constant or declining ratio in the world demand for feed corns in the near future. The country's domestic demand for feed grains is not expected to constitute pressures on the world's supply-demand balance even with its expenditure elasticities and technological conditions being constant at the present level.

For attaining the grain self-sufficiency at a higher level, several policy proposals can still be put forward based on the model results.

First, although China is expected to have a stable or declining influences under the current technological conditions, improvement in the feed conversion efficiency may help further reducing the total demand for feed grains by decreasing the feed grains needed to produce one unit of livestock products.

As mentioned in previous chapters, the feed conversion efficiency in China's livestock raising is still at a relatively low level compared with the developed countries. There is still much potential to improve feed conversion ratios in China. By developing large-scale farms or investing more in research and development of raising technologies, conversion efficiency can be improved so that large amount of feed grains can be saved.

Second, promotion of non-conventional feed resources such as byproducts of grains or crop straws can also save the feed grains needed by replacing grains with the non-conventional feed resources.

China has the tradition of using crop straws or other byproducts of grains for feed. This not only contributes to the decrease in demand for feed grains, but also is beneficial to the environment by preventing these straws from being burned in the case that they are not used for animal feed.

Third, developing aquaculture with feed grains provides another way to save the feed grains.

The PCA results in chapter 2 show that China is not following the Western pattern of diet highly dependent on meats and dairy products, but is moving towards the dietary pattern of East Asia's developed countries (regions) by consuming more fish and seafood. This finding is testified by the

estimation results of expenditure elasticities in chapter 3 that Chinese people tend to consume more fish and seafood with income increases. Such characteristics can be utilized to further reducing the demand for feed grains. Since aquaculture needs much less grains to produce one unit of aquatic products compared with meat and poultry, large quantities of feed grain can be saved if the demand for livestock products can be substituted with aquatic products. Aquaculture has grown dramatically in the past two decades in China. Increased attention should be given to demand for grain for fish farming.

Last, productivity improvements in the grain production may provides more available grains and lead to an even looser supply-demand relationship.

In the model analyses, grain productivity is assumed to be constant at the current level. Nevertheless in realities, technological improvements are expected to proceed. The utilization of biotechnology and improvements in irrigations and soil offer the potential for improved efficiency, increased yields, and reduced production costs.

Chapter 5 Conclusion

By making principal component analysis (PCA) on food consumption data from 174 countries, it finds that China has been progressing for advanced diets by consuming less staple food and more meat, aquatic and dairy products for proteins. However, results of the PCA also show that China is not following the Western pattern of diet highly dependent on meats and dairy products such as the US and UK, but is moving towards the dietary pattern of East Asia's developed countries (regions) by consuming more fish and seafood like Japan, South Korea, Taiwan and Hong Kong; This finding is important because it poses the possibility of much less meat consumption contrary to some economists' assumptions.

Characteristics of China's food consumption are investigated in both urban and rural areas based on estimations of expenditure elasticities. As is well known, urban-rural gaps are significant in China. Clear distinctions exist between urban and rural diets owing to differences in income levels, developmental stages, and lifestyles. It is essential to incorporate both urban and rural China into the analyses in order to have a complete and precise understanding of China's feed grain demand. In this chapter, the expenditure elasticities in both urban and rural areas are estimated through two methods, namely the double logarithmic function (DLF) analysis and the LA/AIDS (linear approximate almost ideal demand system) analysis.

Many results are common across these two analyses. First, expenditure elasticities of most food items tend to decline in both urban and rural areas as the income increases. Second, the urban-rural gaps exist in food consumption, likely due to differences in the speed of economic growth and income level. On the whole, the expenditure elasticity is higher in rural China than in urban China for the same item. Third, similar dietary patterns and preferences are found between urban and rural areas. Estimations show that the Chinese people tend to consume more aquatic products than meats and poultry when their income increases; this pattern is different from the Western experience. Among meats and poultry, poultry is much more income elastic than pork, beef, or mutton. Moreover, among the livestock products, the expenditure elasticities of beef and mutton are higher than that of pork, but the expenditure share of pork is significantly larger than those of beef and mutton.

These results can be explained by China's dietary characteristics. Despite the influences China has felt from the Western diets over the last three decades that have led to higher consumption of milk and beef, the Chinese still regard aquatic products as premium foods, believe in the nutrient value of poultry, and retain pork as their predominant meat product. Compared with beef, the provision

of aquatic products, poultry, and pork requires far fewer feed grains; this means that the increase in feed grains may be mild and thus leads to less stress on China's feed grain balance than the OECD projected.

According to the simulation results of the supply-demand model, projections with the estimated expenditure elasticities for both urban and rural China in the present study yield a less rapid increase in China's feed grain demand and thus price of grains. Under simulations with the estimates in this study, the per capita consumptions on beef and pork are projected to increase at a much slower pace than the scenario using OECD estimates. As a result, China is predicted to account for a constant or declining ratio rather than an increasing one in the world demand for feed corns. The corn price is therefore projected to rise comparatively moderately compared with the OECD scenario. Moreover, most of this rise is hardly considered as the result brought about by China since its influences on the world feed-corn market are expected to weaken or remain stable in the near future.

Based on this model results, it can be concluded that in all likelihood that the OECD may have overestimated China's feed grain demand. In other words, China is expected to sustain its demand for grains without jeopardizing world grain's supply-demand balance and leading to a global price boom in the near future even if its expenditure elasticities and technological conditions remain constant at the present level.

Finally, although China may need not to worry about its self-sufficiency in feed grains based on the model results, several policy proposals are put forward for attaining the grain self-sufficiency at a higher level. These proposals include improving the feed conversion efficiency, promoting uses of non-conventional feed resources, developing aquaculture, and improving productivity in the grain production.

To sum up, two major conclusions can be arrived at in this thesis.

First, China is not following and will not follow the Western dietary pattern as income increases. In the overall changing direction, it is found that rather than consume large quantities of beef and dairy products for protein as some economists have visualized, China is moving towards the pattern of East Asia's developed countries (regions) with preferences for aquatic products. Moreover, from analyses of expenditure elasticities, the Chinese people, in both urban and rural areas, are projected to spend their increased income more on fish and seafood rather than poultry, beef or pork as their income increases.

Second, the future increase of China's grain demand is expected to be sustained without breaking the world's grain supply-demand balance. In this sense, China is predicted to be able to achieve a sustainable self-sufficiency in grain in the near future. However, attention should be paid to several assumptions based on which these conclusions are arrived such as population growth at a medium fertility rate, constant yield hypothesis, static predictions on economic growth rates, and synchronous changes in the corn price between China's domestic and the world market.

References

Alston, J. M., Foster, K. A. and Green, R. D. (1994): Estimating elasticities with the linear approximate almost ideal demand system, Review of Economics and Statistics, 76, 351–356.

Brown, L. (1995): Who will feed China? , Norton & Company Inc., New York.

CAAS (Chinese Academy of Agricultural Sciences) (1985): Study of the development of grain and cash crop production in China, vol.4, CAAS, Beijing.

CAAS (1989): Research on China's grains, China Agricultural Science Press, Beijing.

Center for Food Safety of the Food and Environmental Hygiene Department, Hong Kong (2010): Hong Kong population-based food consumption survey 2005-2007, online data. (http://www.cfs.gov.hk/english/programme/programme_firm/programme_fcs.html)

Chen, Y. F. (2004): China's food: supply, demand and projections, China Agricultural Press, Beijing.

Cheng, G. Q., Zhou, Y. H., Wang, J. M., Shi, Z. L. (1997): Feed demand and supply in China, Problems of Agricultural Economics.

China National Bureau of statistics (1996-2010): China's Statistical Yearbook, China Statistics Press, Beijing.

China National Bureau of statistics (2000-2008): China's Rural Statistical Yearbook, China Statistics Press, Beijing.

China National Bureau of statistics (2000-2008): China Yearbook of Rural Household Survey, China Statistics Press, Beijing.

China National Bureau of statistics (1996-2009): China Urban Life and Price Yearbook, China Statistics Press, Beijing.

China National Bureau of statistics (2004-2009): China Yearbook of Agricultural Price Survey, China

Statistics Press, Beijing.

China National Development and Reform Commission (CNDRC) (2008): National grain security program framework for the medium and long term, Chinese. (http://www.gov.cn/jrzg/2008-11/13/content_1148414.htm)

Chow, G. (1984): The Chinese economy, World scientific publishing company, Teaneck.

Deaton, A. (1975): Models and projections of demand in post-war Britain, Chapman and Hall, London.

Deaton, A. and Muellbauer, J. (1980): An almost ideal demand system, American Economic Review, 70, 312–326.

Felloni, F., Gilbert, J. and Wahl, T. (2003): Trade policy, biotechnology and grain self-sufficiency in China, Agricultural Economics, 28, 173–186.

Fan, S. G., Cramer, G. L. and Wailes, E. J. (1994): Food demand in rural China: evidence from rural household survey, Agricultural Economics, 11, 61–69.

Fan, S. G., Wailes, E. J. and Cramer, G. L. (1995): Household demand in rural China: a two-stage LES-AIDS model, American Journal of Agricultural Economics, 77, 54–62.

FAO (Food and Agriculture Organization of the United Nations): FAOSTAT, various years.

Gao, X. M., Wailes, E. J. and Cramer, G. L. (1996a): A two-stage rural household demand analysis: microdata evidence from Jiangsu province, China, American Journal of Agricultural Economics, 78, 604–613.

Gao, X. M., Wailes, E. J. and Cramer, G. L. (1996b): Partial rationing and Chinese urban household food demand analysis, Journal of Comparative Economics, 22, 43–62.

Garnaut, R. and Ma, G. N. (1992): Grain in China, East Asia Analytical Unit, Department of Foreign Affairs and Trade, Canberra.

Guo, Q. F., Liu, X. A., Teng, H. Y. and Wang, L. (2001): Household animal raising behavior in China's feed grain surplus regions: the case of Jilin, AARC Working Paper No.17, the University of Sidney, Australia.

Halbrendt, C., Tuan, F., Gempesaw, C. and Dolk-Etz, D.(1994): Rural Chinese food consumption: the case of Guangdong, American Journal of Agricultural Economics, 76, 794–799.

Huang, J. K. and Bouis, H. (2001): Structural changes in the demand for food in Asia: empirical evidence from Taiwan, Agricultural Economics, vol. 26, no. 1, 57-69.

Huang J. K., Rozelle, S. and Rosegrant, M. W. (1997): China's food economy to the 21st century: supply, demand, and trade, 2020 Vision Discussion Paper 19, International Food Policy Research Institute, Washington, D.C.

Huang, J. K. and Rozelle, S. (1998): China's grain economy to the 21st century, China Agricultural Press, Beijing.

International Monetary Fund (2011): World economic outlook database. (http://www.imf.org/external/ns/cs.aspx?id=28)

Jiang, B., Davis, J. (2007): Household food demand in rural China, Applied Economics, vol. 39, no. 3, 373.

Jolliffe, I. T. (1986): Principal component analysis, Springer-Verlag, New York.

Koizumi, T. (2007): Bio-ethanol and world food supply and demand, Tsukuba-shobo, Tokyo, 145-175. (In Japanese)

Lewis, P. and Andrews, N. (1989): Household demand in China, Applied Economics, 21, 793–807.

Liu, J. (1988): Strategic issues for the development of animal husbandry, Chinese Rural Economy, 2, 5-12.

Ministry of Land and Resources of China (1998-2010): China land and resources report, http://www.mlr.gov.cn/

Mitchell, D. and Ingco, M. (1993): The world food outlook, International Economics Department of the World Bank, Washington, DC.

OECD and FAO (2011): Database- OECD-FAO agricultural outlook 2011-2020, Paris. http://www.oecd.org/document/15/0,3746,en_36774715_36775671_48172367_1_1_1_1,00.html

OECD and FAO (2011): OECD-FAO agricultural outlook 2011-2020, Paris.

OECD (2007): Documentation of the AGLINK-COSIMO model, Paris.

Pollak, R. A. and Wales, T. J. (1978): Estimation of complete demand systems from household budget data: the linear and quadratic expenditure systems, American Economic Review, 68, 348–359.

Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2009): World Urbanization Prospects: The 2009 revision, the United Nations. http://esa.un.org/wup2009/unup/

Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2009): World population ageing: The 2009 revision, the United Nations. (http://esa.un.org/unpd/wpp/index.htm)

Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2010): World population prospects: The 2010 revision, the UN (United Nations). (http://esa.un.org/unpd/wpp/index.htm)

Shen, J. H. (2007): Modern agricultural economics of China: the process and challenges to economical modernization, Association of Agriculture & Forestry Statistics, Tokyo. (In Japanese)

Shono, C., Suzuki, N. and Kaiser, H. M. (2000): Will China's diet follow Western diets?, Agribusiness, Vol. 16, 271-279.

Taiwan, Council of Agriculture, Executive Yuan: Food Balance Sheets, various years.

USDA Foreign Agricultural Service: Production, Supply and Distribution Online database, USDA. (http://www.fas.usda.gov/psdonline/psdHome.aspx)

Van der Gaag, J. (1984): Private household consumption in China: a study of people's livelihood, World Bank Staff Working Paper 701.

World Bank: World databank, various years. (http://databank.worldbank.org/ddp/home.do)

Wu, Y. R., Li, E. and Samuel, N. (1995): Food consumption in urban China: an empirical analysis, Applied Economics, 27, 509-515.

Zellner, A. (1962): An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias, Journal of the American Statistical Association, 57, 348–368.

Zhou, Z. Y. and Tian, W. M. (2005): Grains in China: foodgrain, feedgrain and world trade, Ashgate Publishing, Aldershot.

Zhou, Z. Y., Tian, W. M. and Malcolm, B. (2008): Supply and demand estimates for feed grains in China, Agricultural Economics, 39, 111–122.

Acknowledgements

In the 31 years of my life, completing my Ph.D. thesis is probably one of the most serious challenges since the Doctor's course is not only a new academic start but also a brand-new experience for me in another country. I would like to express my gratitude to all those who helped make it possible.

I am deeply indebted to my supervisor, Prof. Nobuhiro Suzuki, whose guidance and encouragement from the determination of the subject to the research and writing enabled me to complete this thesis. His passion for promoting Japan's agriculture and rational and rigorous attitude in research set a good example for me.

I would like to thank the other members of my thesis committee, Dr. Masayoshi Honma, Dr. Kazuhiko Kobayashi and Dr. Hisashi Kurokura from the University of Tokyo and Dr. Xiaoping Qian from Japan International Research Center for Agricultural Sciences (JIRCAS). They gave me insightful comments and constructive suggestions, which encouraged me to promote this thesis.

I am heartily grateful to Dr. Taro Takahashi, who gave me a lot of precious advices and patient guidance in both the research methods and writing of thesis. I owe my sincere appreciation to him.

Special thanks go to Dr. Atsuyuki Uebayashi from Policy Research Institute of Ministry of Agriculture, Forestry and Fisheries, Dr. James R. Simpson from Washington State University, and Dr. Katsuhiro Saito from the University of Tokyo for their generous help and invaluable suggestions.

Excellent members past and present of International Environmental Economics Lab. also deserve my sincerest thanks. Discussions with them at seminars have broadened my horizons, and without the friendly environment they created I could not have been adapted to the new academic life.

My deepest thanks go to my family. My parents, brother, and parents-in-law gave their understanding and unconditional support to my research especially after the 3.11 earthquake in 2011. Particular thanks go to my husband, without whose support, criticism and encouragement I would not have been able to complete this thesis.

Hui JIANG

姜　薈

March, 2012

Appendix

Appendix A Principal Component Analysis (PCA)

Table A.1 Per capita daily food supply in 174 countries, 2005 (to be continued)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Albania	E	431.31	85.39	516.27	112.04	686.75	12.35
Algeria	B	611.08	158.85	325.01	59.20	237.77	12.44
Angola	B	225.81	46.26	60.49	51.60	29.71	35.70
Antigua and Barbuda	G	201.70	36.44	253.62	215.95	248.66	148.02
Argentina	D	388.73	94.19	184.47	242.70	275.36	17.87
Armenia	A	366.89	222.47	649.93	80.12	269.83	7.67
Australia	F	224.21	146.46	272.06	322.17	246.93	68.15
Austria	E	323.46	166.58	253.75	298.86	55.20	36.68
Azerbaijan	A	484.17	253.87	449.78	53.25	325.06	5.12
Bahamas	G	221.27	89.63	279.97	270.71	112.12	85.77
Bangladesh	A	498.08	72.24	45.86	8.59	38.59	38.36
Barbados	G	284.56	118.01	239.69	201.00	162.25	103.35
Belarus	E	339.66	497.90	354.31	166.94	291.10	42.56
Belgium	E	308.08	206.28	336.77	225.73	157.09	67.94
Belize	C	385.24	30.41	114.72	134.69	166.23	36.64
Benin	B	288.06	0.56	122.70	33.70	22.68	28.28
Bermuda	C	234.82	42.17	325.38	208.54	55.89	106.10
Bolivia	D	297.67	140.82	136.49	140.54	88.13	4.85
Bosnia and Herzegovina	E	465.86	245.81	541.03	59.45	344.20	20.01
Botswana	B	329.26	61.84	55.78	71.34	177.84	6.70
Brazil	D	327.63	41.38	116.86	221.47	315.51	16.37
Brunei Darussalam	A	452.98	33.66	258.96	166.10	266.42	97.08
Bulgaria	E	383.28	103.62	189.34	140.18	254.96	11.36
Burkina Faso	B	646.30	0.38	47.02	43.59	39.87	4.75

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-1)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Burundi	B	84.30	6.30	78.45	10.03	7.89	4.96
Côte d'Ivoire	B	237.82	2.91	109.89	35.65	23.99	41.19
Cambodia	A	458.13	0.03	85.49	44.90	13.56	70.31
Cameroon	B	279.74	13.84	206.38	36.88	36.82	40.25
Canada	C	326.68	230.92	326.43	263.92	94.80	65.89
Cape Verde	B	341.65	80.05	137.48	92.32	235.00	42.73
Central African Republic	B	147.58	0.46	43.53	84.82	44.08	11.19
Chad	B	367.18	5.52	23.18	34.46	61.20	16.47
Chile	D	392.56	138.87	292.93	193.38	164.86	56.14
China	05 CHN	426.37	108.35	741.31	148.32	59.36	70.27
Colombia	D	280.94	72.39	95.92	104.72	306.19	14.95
Comoros	B	195.19	2.20	27.70	30.60	24.01	56.05
Congo	B	199.99	3.89	124.54	57.66	54.76	54.03
Congo	B	92.25	3.22	23.06	12.65	3.46	14.61
Costa Rica	C	282.80	46.39	113.86	108.21	391.21	21.06
Croatia	E	329.94	181.43	202.23	106.65	348.11	40.81
Cuba	G	414.71	72.73	499.42	86.57	127.44	23.59
Cyprus	A	247.03	121.90	438.09	285.95	319.80	63.22
Czech Republic	E	370.08	213.64	216.50	237.38	75.64	28.74
Denmark	E	365.09	207.60	267.63	276.02	89.14	67.55
Djibouti	B	368.44	0.54	93.37	57.16	143.06	2.94
Dominica	G	271.13	27.09	255.55	195.17	347.95	73.23
Dominican Republic	G	209.19	15.96	137.70	130.75	187.96	27.73
Ecuador	D	252.47	76.95	68.12	127.53	242.78	12.31
Egypt	B	666.89	62.18	531.43	61.23	29.67	43.93
El Salvador	C	364.29	26.61	172.26	68.25	218.92	18.09

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-2)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Eritrea	B	323.77	8.92	21.92	19.54	28.74	2.38
Estonia	E	325.73	302.89	224.32	163.63	329.06	44.88
Ethiopia	B	365.38	13.01	31.64	22.85	48.17	0.37
Fiji	F	398.47	66.14	116.89	123.60	85.05	99.33
Finland	E	311.79	197.02	215.73	193.94	324.96	87.49
France	05 FRA	341.26	175.64	386.08	242.79	141.41	96.45
French Polynesia	F	283.52	90.78	181.37	278.13	154.17	133.56
Gabon	B	314.70	6.76	127.76	176.50	81.37	109.15
Gambia	B	355.57	15.44	89.54	23.91	51.23	55.66
Georgia	A	506.23	146.81	249.84	85.48	396.79	12.03
Germany	E	313.83	208.30	240.21	228.27	202.03	40.39
Ghana	B	259.68	0.31	82.79	29.06	7.65	73.53
Greece	E	412.69	191.72	713.87	216.98	230.29	57.84
Grenada	G	180.93	44.42	92.76	179.11	129.93	99.37
Guatemala	C	361.69	32.52	136.52	67.28	79.87	5.97
Guinea	B	357.66	0.39	155.63	20.49	33.92	30.30
Guinea-Bissau	B	376.95	0.60	41.19	35.27	35.59	4.25
Guyana	D	409.48	31.87	140.09	101.23	167.58	94.32
Haiti	G	277.50	2.94	60.02	38.52	35.03	7.76
Honduras	C	357.83	13.41	106.42	100.08	218.76	8.73
Hungary	E	327.55	178.64	308.99	181.39	209.13	13.95
Iceland	E	213.08	169.02	179.28	229.34	227.30	249.16
India	A	398.96	42.07	202.05	13.84	105.10	12.97
Indonesia	A	471.63	11.46	96.67	27.29	12.23	56.12
Iran	A	531.25	157.57	526.81	83.27	91.60	18.87
Ireland	E	347.24	319.85	201.26	275.94	473.96	61.49

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-3)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Israel	A	426.64	127.41	530.51	273.11	194.86	58.32
Italy	E	435.23	112.19	497.93	241.18	120.85	67.59
Jamaica	G	275.56	29.61	188.69	167.64	200.91	74.07
Japan	05JPN	312.86	60.01	293.06	124.50	111.94	165.88
Jordan	A	425.36	76.34	365.55	100.09	131.67	12.98
Kazakhstan	A	504.13	282.65	442.09	153.37	613.11	7.95
Kenya	B	351.19	60.41	121.35	42.21	203.78	10.31
Kiribati	F	282.30	4.10	166.94	112.62	2.38	205.49
Korea (DPRK)	A	417.09	163.19	411.79	40.00	10.36	22.64
Korea, Republic of	05 KOR	394.67	43.56	602.42	134.04	32.48	144.55
Kuwait	A	383.89	34.01	409.60	254.60	106.41	27.88
Kyrgyzstan	A	601.76	393.37	352.46	95.48	534.21	3.88
Laos	A	516.99	13.65	396.70	48.17	10.90	54.49
Latvia	E	313.38	323.45	297.99	157.53	442.32	34.01
Lebanon	A	357.50	268.81	540.31	149.32	133.47	19.94
Lesotho	B	635.66	121.36	36.74	46.88	51.09	0.06
Liberia	B	245.75	1.60	58.11	26.08	9.84	9.69
Libyan Arab Jamahiriya	B	448.47	86.55	540.05	75.57	172.84	28.16
Lithuania	E	416.35	325.72	310.62	193.34	335.96	100.82
Madagascar	B	329.42	17.90	45.14	39.03	71.69	18.48
Malawi	B	375.48	289.03	58.85	12.72	8.92	12.50
Maldives	A	312.45	33.48	315.10	53.11	222.55	493.42
Mali	B	554.09	18.97	148.11	61.50	154.59	24.95
Malta	E	447.06	194.27	562.22	225.64	235.29	83.30
Mauritania	B	430.10	5.21	13.00	88.26	323.42	49.80
Mauritius	B	432.63	44.42	208.24	116.17	171.06	57.80

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-4)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Mexico	C	471.01	44.53	167.41	170.28	252.81	30.50
Moldova	E	537.15	207.10	267.61	104.70	368.03	31.27
Mongolia	A	346.71	103.75	80.91	198.20	322.49	0.60
Morocco	B	706.50	110.54	371.01	65.07	34.20	26.91
Mozambique	B	314.68	9.51	14.32	15.74	10.46	6.55
Myanmar	A	465.16	23.13	200.68	62.94	35.46	71.61
Namibia	B	335.77	29.03	38.80	82.45	185.32	41.65
Nepal	A	459.03	133.90	177.32	26.68	84.52	4.33
Netherlands	E	213.58	233.37	237.02	202.35	307.71	52.54
Netherlands Antilles	G	406.60	118.90	84.14	260.84	127.33	58.66
New Caledonia	F	291.57	79.41	105.70	150.17	192.39	57.86
New Zealand	F	256.58	185.58	339.64	284.80	360.22	73.92
Nicaragua	C	372.85	19.48	21.81	55.73	137.48	10.61
Niger	B	538.29	0.74	121.33	31.28	31.94	9.50
Nigeria	B	388.04	8.53	158.58	20.51	11.80	24.61
Norway	E	344.13	207.43	202.23	180.06	163.84	143.37
Occupied Palestinian Territory	A	375.13	34.92	409.33	74.02	123.84	1.32
Pakistan	A	363.22	29.55	84.67	33.53	241.13	4.66
Panama	C	345.31	33.69	77.28	158.06	135.46	34.48
Paraguay	D	246.89	5.98	180.05	104.53	171.67	11.32
Peru	D	382.26	225.32	119.24	71.02	115.53	52.74
Philippines	A	410.88	4.91	171.60	81.20	9.80	89.36
Poland	E	414.88	358.81	314.48	210.28	91.67	26.08
Portugal	E	372.18	215.46	463.22	235.68	233.81	151.80
Romania	E	510.73	281.31	543.56	175.10	621.50	14.29
Russian Federation	E	416.65	361.43	291.31	142.75	336.34	50.94

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-5)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Rwanda	B	107.80	342.06	71.61	15.39	38.42	2.54
Saint Kitts and Nevis	G	209.45	23.28	133.96	233.99	114.86	87.72
Saint Lucia	G	284.24	44.06	104.82	241.38	177.03	116.51
Saint Vincent and Grenadines	G	303.89	37.75	126.52	210.13	137.84	40.75
Samoa	F	188.17	14.75	30.10	225.70	51.83	138.21
Sao Tome and Principe	B	288.45	4.35	149.65	37.43	55.58	64.58
Saudi Arabia	A	440.09	51.91	284.34	149.23	133.66	25.72
Senegal	B	445.46	13.91	141.06	34.03	68.15	73.35
Serbia and Montenegro	E	220.93	131.43	337.59	224.56	381.21	12.23
Seychelles	B	312.56	40.81	203.61	79.50	38.44	169.89
Sierra Leone	B	276.91	0.49	117.15	13.36	10.46	69.39
Slovakia	E	322.60	176.32	204.79	177.26	52.75	22.02
Slovenia	E	378.84	169.04	239.39	257.14	200.95	25.83
Solomon Islands	F	263.21	0.18	46.46	21.37	11.01	87.06
South Africa	B	492.70	79.81	115.82	126.53	113.03	23.71
Spain	E	262.48	199.60	426.86	293.82	281.64	111.33
Sri Lanka	A	419.14	15.18	95.36	19.54	71.20	39.44
Sudan	B	351.63	24.30	108.91	60.34	473.97	4.57
Suriname	D	357.77	45.20	183.69	124.34	49.29	46.64
Swaziland	B	317.53	26.62	56.74	89.30	168.82	18.32
Sweden	E	281.72	166.98	235.00	211.20	213.56	79.12
Switzerland	E	287.93	123.96	258.13	198.03	275.23	41.54
Syrian Arab Republic	A	463.39	73.23	331.83	53.47	213.70	6.20
Tajikistan	A	610.97	88.22	312.98	32.63	205.61	0.47
Tanzania	B	328.88	14.52	76.44	26.05	55.84	18.42
Thailand	A	352.75	15.70	118.29	73.29	32.70	86.67

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.1 Per capita daily food supply in 174 countries, 2005 (continued-6)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
The former Yugoslav Republic of Macedonia	E	381.30	155.40	387.92	103.95	72.16	13.20
Timor-Leste	A	488.54	2.29	63.19	93.02	29.71	0.90
Togo	B	322.48	0.68	67.89	17.92	10.04	22.17
Trinidad and Tobago	G	335.55	70.66	96.13	114.61	119.61	56.17
Tunisia	B	567.55	76.85	508.06	70.32	212.75	35.59
Turkey	A	570.60	124.13	631.86	58.08	268.55	18.99
Turkmenistan	A	579.17	79.36	383.13	117.26	380.02	9.22
Uganda	B	178.18	37.80	47.30	27.90	66.24	31.61
Ukraine	E	429.52	374.01	335.01	105.75	356.11	45.72
United Arab Emirates	A	451.52	10.31	409.59	198.46	182.30	65.76
United Kingdom	05 UK	308.66	313.54	263.48	229.94	327.57	56.35
United States of America	05 US	303.46	161.15	325.30	346.87	318.29	66.13
Uruguay	D	461.14	109.19	151.55	187.39	269.40	20.95
Uzbekistan	A	496.82	87.57	350.74	67.16	370.28	0.81
Vanuatu	F	274.59	92.06	140.09	86.60	44.50	88.02
Venezuela, Bolivarian Republic of	D	343.49	36.68	164.12	166.48	95.69	47.03
Viet Nam	A	510.83	11.81	229.66	95.68	16.01	72.39
Yemen	A	377.04	25.56	90.79	46.85	48.29	23.78
Zambia	B	375.49	5.87	63.25	36.72	17.12	18.86
Zimbabwe	B	393.98	7.30	17.16	46.38	35.40	3.37

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.2 Per capita daily food supply in Eastern Asian countries (regions) (to be continued)

Unit: g/capita/day

Countries	Year	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Japan	1970	70JPN	392.91	63.58	345.13	47.89	91.03	170.91
	1975	75JPN	387.68	67.39	329.86	63.33	95.83	189.88
	1980	80JPN	343.92	65.22	333.13	81.94	111.77	176.9
	1985	85JPN	335.49	67.4	324.84	91.55	114.41	189.51
	1990	90JPN	324.91	68.63	316.2	104.04	131.35	193.77
	1995	95JPN	319.86	67.82	316.79	119.54	129.22	193.53
	2000	00JPN	319.95	63.86	305.71	119.57	119.47	182.39
	2005	05JPN	312.86	60.01	293.06	124.5	111.94	165.88
Korea	1970	70KOR	587.72	40.36	280.54	14.59	1.27	49.51
	1975	75KOR	634.17	41.52	398.07	19.17	3.49	104.88
	1980	80KOR	536.32	24.36	532.58	35.45	15.51	110.6
	1985	85KOR	518.66	30.96	494.14	50.03	25.62	128.65
	1990	90KOR	463.13	18.48	550.92	69.38	30.41	127.91
	1995	95KOR	457.93	29.37	604.13	104.35	26.11	136
	2000	00KOR	431.72	34.66	634.59	128.13	38.46	122.99
	2005	05KOR	394.67	43.56	602.42	134.04	32.48	144.55
China	1970	70CHN	351.62	36.68	121.69	24.86	4.76	12.34
	1975	75CHN	373.77	33.84	129.35	29.11	4.97	15.37
	1980	80CHN	422.63	27.22	135.47	40.07	5.67	14.11
	1985	85CHN	488.88	27.78	216.05	53.1	8.87	19.99
	1990	90CHN	520.89	38.58	272.64	71.34	12.68	31.37
	1995	95CHN	482.01	42	407.56	107.75	16.75	56.85
	2000	00CHN	451.54	91.9	613.53	135.52	21.73	67
	2005	05CHN	426.37	108.35	741.31	148.32	59.36	70.27
	2007	07CHN	417.71	89.13	766.83	146.43	73.46	72.49
Taiwan	1985	85TW	302.65	11.95	283.36	152.74	23.27	96.24
	1990	90TW	280.08	26.06	255.67	172.3	40.88	130.05
	1995	95TW	274.95	23.52	279.04	199.32	63.11	105.05
	2000	00TW	252.68	30.21	315.30	215.85	64.47	109.88
	2005	05TW	250.65	30.62	285.68	211.29	55.32	81.81
	2008	08TW	224.29	27.51	282.62	198.78	52.04	94.44
Hong Kong	2005-07	05-07HK	488.75	8.05	168.91	112.5	34.23	70.78

Table A.2 Per capita daily food supply in Eastern Asian countries (regions) (continued)

Unit: g/capita/day

Countries	Year	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
US	1970	70US	218.73	146.81	259.49	289.67	483.32	39.64
	1975	75US	230.7	147.83	289.64	279.06	391.61	38.57
	1980	80US	236.94	136.7	279.23	295.81	374.15	41.97
	1985	85US	253.3	149.37	304.12	300.81	381.46	51.65
	1990	90US	295.62	150.43	317.48	306.87	352	57.38
	1995	95US	336.22	161.93	333.82	320.81	347.1	59.59
	2000	00US	320.53	173.21	353	332.87	329.54	59.98
	2005	05US	303.46	161.15	325.3	346.87	318.29	66.13
UK	1970	70UK	272.69	287.42	206.67	198.68	418.94	57.36
	1975	75UK	262.56	247.88	193.53	187.17	420.93	46.12
	1980	80UK	249.6	289.54	213.93	193.49	382.7	43.89
	1985	85UK	267.57	292.57	222.76	193.12	372.22	50.61
	1990	90UK	254.6	289.77	241.75	197.08	366.19	51.09
	1995	95UK	257.23	300.29	211.25	201.47	333.42	50.47
	2000	00UK	295.77	338.25	228.68	212.16	330.69	54.44
	2005	05UK	308.66	313.54	263.48	229.94	327.57	56.35
France	1970	70FRA	280.07	264.25	369.01	236.75	298.13	56.53
	1975	75FRA	265.04	249.02	314.76	251.3	209.71	61.11
	1980	80FRA	280.08	203.21	315.01	276.66	223.88	68.07
	1985	85FRA	300.64	208.21	344.68	268.49	291.2	72.09
	1990	90FRA	300.17	197.32	346.72	270.94	227.01	87.7
	1995	95FRA	302.08	193.78	368.87	266.86	204.93	83.13
	2000	00FRA	316.83	184.72	397.93	275.32	154.27	84.33
	2005	05FRA	341.26	175.64	386.08	242.79	141.41	96.45

Source: FAOSTAT, Taiwan Council of Agriculture, Executive Yuan, Food Balance Sheets, various years, The Chinese University of Hong Kong (2010).

Table A.3 Per capita daily food supply in 174 countries, 2000 (to be continued)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Albania	E	471.69	85.79	460.87	79.12	625.86	9.16
Algeria	B	597.87	105.59	215.98	52.26	192.52	10.89
Angola	B	183.76	4.33	54.91	43.09	34.66	33.03
Antigua and Barbuda	G	221.81	14.80	135.25	197.31	300.44	123.51
Argentina	D	380.72	133.01	204.11	269.44	295.00	25.70
Armenia	A	406.47	174.77	329.54	58.11	230.16	3.01
Australia	F	224.41	144.96	270.06	300.41	339.23	59.06
Austria	E	317.83	168.32	219.26	309.89	224.54	25.77
Azerbaijan	A	489.73	128.76	271.46	44.88	282.86	2.79
Bahamas	G	237.65	74.98	348.46	289.92	149.08	86.58
Bangladesh	A	490.75	47.03	32.65	8.42	35.27	31.71
Barbados	G	264.73	103.92	166.53	200.20	151.46	94.63
Belarus	E	388.57	477.57	259.44	161.44	280.50	26.64
Belgium	E	294.88	262.63	320.12	224.38	182.49	66.43
Belize	C	316.72	41.84	154.32	114.65	141.00	39.49
Benin	B	261.99	0.18	133.36	38.58	21.19	20.96
Bermuda	C	194.42	60.10	321.27	276.45	78.14	93.19
Bolivia	D	294.40	199.42	153.55	132.88	83.52	7.20
Bosnia and Herzegovina	E	481.51	185.51	465.67	50.41	323.33	7.32
Botswana	B	300.51	30.89	127.46	62.11	270.25	13.03
Brazil	D	271.07	35.04	102.97	216.96	288.07	16.51
Brunei Darussalam	A	467.14	22.38	205.99	160.50	94.51	92.63
Bulgaria	E	428.53	87.45	389.02	157.88	291.37	8.53
Burkina Faso	B	587.58	0.85	51.39	40.64	42.03	6.22

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-1)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Burundi	B	79.34	5.28	89.60	9.27	10.23	7.20
Côte d'Ivoire	B	244.78	2.79	91.17	33.06	13.87	33.32
Cambodia	A	501.73	0.02	91.37	42.89	6.37	55.27
Cameroon	B	254.71	16.81	214.36	39.85	38.15	34.97
Canada	C	324.94	218.70	329.36	277.52	162.08	65.54
Cape Verde	B	345.63	58.67	119.20	67.59	175.61	61.42
Central African Republic	B	126.74	0.50	46.16	82.59	44.54	11.20
Chad	B	321.94	6.62	24.99	36.82	66.55	18.19
Chile	D	374.78	141.11	272.44	180.02	180.21	33.38
China	00 CHN	451.54	91.90	613.53	135.52	21.73	67.00
Colombia	D	274.00	133.40	105.53	92.07	306.70	12.67
Comoros	B	207.61	3.94	24.47	17.09	24.06	55.36
Congo	B	183.48	3.31	109.48	39.58	40.36	53.55
Congo	B	88.26	7.63	21.47	12.92	2.40	15.37
Costa Rica	C	292.04	54.13	99.73	116.07	402.77	17.45
Croatia	E	280.00	288.04	278.60	96.97	285.42	19.65
Cuba	G	341.49	85.37	366.08	88.05	169.46	31.47
Cyprus	A	281.47	109.48	437.67	288.37	351.26	61.50
Czech Republic	E	292.21	219.19	208.85	210.09	89.36	29.12
Denmark	E	294.00	217.64	246.37	310.99	183.97	61.09
Djibouti	B	354.50	6.17	98.07	45.65	197.98	3.23
Dominica	G	260.02	21.88	244.34	190.53	341.33	112.54
Dominican Republic	G	224.10	5.92	115.54	108.59	101.66	24.82
Ecuador	D	273.46	29.24	62.34	110.13	243.38	16.17
Egypt	B	670.19	52.24	550.16	64.06	38.27	40.47
El Salvador	C	375.49	28.30	128.70	55.44	202.47	6.50

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-2)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Eritrea	B	335.86	26.36	25.92	23.26	49.02	8.81
Estonia	E	339.42	387.91	187.23	162.01	287.30	43.79
Ethiopia	B	353.14	12.80	30.44	20.92	43.72	0.62
Fiji	F	394.46	63.00	100.60	124.44	96.06	91.77
Finland	E	293.63	190.38	194.90	178.92	373.70	85.94
France	00 FRA	316.83	184.72	397.93	275.32	154.27	84.33
French Polynesia	F	277.53	81.72	171.86	265.67	139.06	131.42
Gabon	B	275.90	9.75	129.03	162.50	84.27	128.89
Gambia	B	361.75	14.35	83.48	16.54	57.99	56.05
Georgia	A	483.59	134.58	206.44	78.12	348.36	2.47
Germany	E	276.80	210.47	248.08	230.68	154.18	37.53
Ghana	B	227.95	0.53	84.10	25.26	8.61	77.84
Greece	E	408.16	216.59	789.88	263.24	226.83	59.97
Grenada	G	206.48	25.75	75.15	140.67	169.84	54.01
Guatemala	C	348.71	17.74	117.04	62.47	81.93	4.23
Guinea	B	359.03	0.15	157.78	17.07	37.49	34.68
Guinea-Bissau	B	385.59	0.39	45.72	38.01	38.22	7.97
Guyana	D	385.94	35.39	275.52	103.68	231.86	116.18
Haiti	G	265.52	2.51	68.87	35.59	36.45	6.02
Honduras	C	344.64	6.75	105.25	69.43	235.02	9.27
Hungary	E	329.69	178.33	316.17	238.76	201.46	11.44
Iceland	E	211.95	156.80	140.90	222.36	254.14	250.78
India	A	407.69	48.48	175.47	12.83	109.00	12.20
Indonesia	A	484.85	11.24	85.88	22.61	10.81	55.65
Iran	A	558.78	128.26	401.44	65.42	77.30	13.37
Ireland	E	350.55	343.37	200.83	267.70	524.39	66.85

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-3)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Israel	A	388.27	106.90	639.84	255.66	153.06	55.00
Italy	E	437.69	110.15	526.41	247.98	138.95	61.20
Jamaica	G	264.14	21.15	188.83	148.40	214.41	54.19
Japan	00JPN	319.95	63.86	305.71	119.57	119.47	182.39
Jordan	A	400.44	49.26	239.96	95.26	122.23	10.78
Kazakhstan	A	405.38	188.44	242.59	117.60	558.27	10.48
Kenya	B	328.24	44.29	124.33	32.81	194.57	16.55
Kiribati	F	281.35	4.19	162.20	77.40	40.28	204.51
Korea (DPRK)	A	407.77	151.69	404.72	30.75	10.21	26.43
Korea, Republic of	00 KOR	431.72	34.66	634.59	128.13	38.46	122.99
Kuwait	A	352.66	90.55	504.40	184.98	239.60	25.07
Kyrgyzstan	A	605.48	298.65	354.67	106.00	523.95	2.41
Laos	A	504.46	13.28	344.53	38.29	8.44	39.74
Latvia	E	325.21	323.77	195.73	101.02	358.90	47.28
Lebanon	A	342.30	135.05	617.09	127.39	115.70	17.23
Lesotho	B	612.53	127.47	58.43	44.52	50.25	0.06
Liberia	B	234.92	0.36	64.57	22.79	5.37	14.88
Libyan Arab Jamahiriya	B	532.07	95.39	587.77	84.00	133.09	26.02
Lithuania	E	466.55	371.91	256.55	135.21	299.17	100.51
Madagascar	B	311.99	27.50	51.42	41.58	89.79	21.24
Malawi	B	388.05	248.83	54.53	13.91	9.25	12.75
Maldives	A	328.67	26.71	386.14	38.58	142.13	500.70
Mali	B	531.70	15.09	144.45	53.88	153.23	28.09
Malta	E	421.81	233.28	542.34	215.29	249.35	80.37
Mauritania	B	439.06	14.00	35.95	89.14	337.24	40.86
Mauritius	B	428.03	42.40	218.57	95.89	242.90	63.02

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-4)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Mexico	C	481.22	43.18	163.86	151.04	238.93	27.37
Moldova	E	500.21	147.43	199.11	53.05	317.23	11.34
Mongolia	A	344.54	60.03	47.45	278.91	394.89	0.62
Morocco	B	679.50	80.74	252.68	56.69	30.74	19.51
Mozambique	B	284.01	11.58	16.15	14.45	11.40	4.68
Myanmar	A	462.00	12.63	178.68	30.17	23.99	50.94
Namibia	B	337.08	38.92	44.83	110.11	123.38	36.20
Nepal	A	472.38	99.06	153.57	26.63	78.42	3.60
Netherlands	E	180.98	282.95	259.48	239.46	276.91	59.19
Netherlands Antilles	G	361.74	138.95	193.20	265.68	85.20	63.80
New Caledonia	F	338.68	61.82	105.72	163.39	217.57	64.62
New Zealand	F	276.10	184.00	361.11	253.63	149.76	62.13
Nicaragua	C	315.93	22.54	23.71	44.05	162.64	8.50
Niger	B	555.68	1.62	159.93	31.47	27.08	3.34
Nigeria	B	373.99	7.23	154.42	20.88	11.11	18.01
Norway	E	344.89	195.92	166.32	165.53	214.04	135.37
Occupied Palestinian Territory	A	378.32	36.67	430.81	89.96	99.75	2.25
Pakistan	A	401.90	28.53	88.35	32.11	234.76	6.33
Panama	C	277.43	21.54	73.13	165.93	141.75	20.19
Paraguay	D	233.64	5.72	174.23	194.16	166.38	15.12
Peru	D	376.30	236.08	133.27	59.74	113.80	58.90
Philippines	A	381.01	4.63	170.03	80.24	14.79	80.55
Poland	E	424.14	364.47	348.21	193.35	165.03	27.15
Portugal	E	361.66	210.92	482.47	242.51	237.28	148.61
Romania	E	519.68	242.34	410.76	131.43	503.99	7.19
Russian Federation	E	403.12	321.18	229.55	108.71	336.34	48.84

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-5)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Rwanda	B	84.84	226.19	78.62	12.46	37.78	2.45
Saint Kitts and Nevis	G	209.74	24.96	162.83	215.71	110.27	95.41
Saint Lucia	G	269.68	40.80	73.67	252.55	166.89	78.58
Saint Vincent and Grenadines	G	307.88	16.77	90.44	170.87	133.86	40.43
Samoa	F	200.28	13.47	29.11	202.37	71.99	147.23
Sao Tome and Principe	B	272.58	1.68	110.86	21.76	4.41	68.19
Saudi Arabia	A	440.07	54.53	233.33	140.89	159.29	18.72
Senegal	B	405.21	8.19	119.51	30.92	28.11	81.94
Serbia and Montenegro	E	265.27	94.06	256.75	240.35	372.68	4.66
Seychelles	B	282.46	38.04	201.61	78.67	152.42	131.16
Sierra Leone	B	291.75	0.41	103.19	14.57	6.95	42.92
Slovakia	E	363.39	197.58	225.75	156.06	61.24	18.88
Slovenia	E	360.94	229.61	206.88	272.27	252.11	17.85
Solomon Islands	F	230.68	0.13	47.90	20.59	20.34	86.18
South Africa	B	490.53	79.92	112.45	112.59	109.84	17.09
Spain	E	271.67	209.31	451.51	311.89	300.36	118.64
Sri Lanka	A	378.85	21.37	89.23	14.84	75.71	59.86
Sudan	B	354.64	18.59	127.44	53.60	372.77	4.46
Suriname	D	369.82	45.37	151.43	117.47	49.94	42.40
Swaziland	B	336.17	59.95	55.10	68.82	189.55	16.22
Sweden	E	277.81	149.84	203.75	188.80	217.47	76.87
Switzerland	E	316.25	158.87	271.21	193.41	252.19	40.58
Syrian Arab Republic	A	464.15	62.24	216.96	58.21	156.13	4.82
Tajikistan	A	454.43	103.59	170.76	24.15	127.81	0.16
Tanzania	B	308.39	15.54	84.88	27.05	53.80	20.15
Thailand	A	338.48	11.86	112.59	67.74	35.08	83.03

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.3 Per capita daily food supply in 174 countries, 2000 (continued-6)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
The former Yugoslav Republic of Macedonia	E	360.04	136.23	516.16	86.56	101.59	12.29
Timor-Leste	A	525.76	2.06	78.33	98.99	31.76	1.21
Togo	B	312.12	0.61	65.71	20.31	8.12	24.83
Trinidad and Tobago	G	329.20	61.23	85.17	99.67	133.96	25.21
Tunisia	B	566.26	77.74	488.82	71.05	219.30	28.09
Turkey	A	592.04	172.78	639.57	55.99	245.63	20.37
Turkmenistan	A	567.86	46.25	281.24	92.78	353.66	6.01
Uganda	B	163.18	35.98	54.77	29.55	53.92	20.48
Ukraine	E	433.24	369.89	280.92	85.94	364.98	35.65
United Arab Emirates	A	416.36	53.46	733.52	186.26	240.73	64.78
United Kingdom	00 UK	295.77	338.25	228.68	212.16	330.69	54.44
United States of America	00 US	320.53	173.21	353.00	332.87	329.54	59.98
Uruguay	D	387.73	105.40	150.09	250.36	408.52	21.34
Uzbekistan	A	463.41	74.80	297.91	57.80	369.97	1.09
Vanuatu	F	216.91	90.71	146.97	96.33	55.99	87.40
Venezuela, Bolivarian Republic of	D	322.46	46.57	123.94	162.90	118.93	41.74
Viet Nam	A	502.70	9.66	201.62	66.09	12.44	55.59
Yemen	A	430.40	27.92	79.87	35.10	14.72	12.94
Zambia	B	390.97	2.76	63.30	35.97	17.24	18.93
Zimbabwe	B	394.05	6.09	27.32	36.16	36.43	5.54

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.4 Estimation Results of the PCA in 2000

PC	VAR(PC_i)	Contribution Proportion	Cumulative Contribution
PC1	2.257	0.376	0.376
PC2	1.397	0.233	0.609
PC3	0.971	0.162	0.771
PC4	0.546	0.091	0.862
PC5	0.495	0.082	0.944
PC6	0.335	0.056	1.000

Source: calculated according to 2000 data of FAOSTAT.

Table A.5 Coefficients of PCi (aij) in 2000 PCA results

Variable	PC1	PC2	PC3
Cereals	0.107	0.709	0.381
Potatoes	0.519	0.077	-0.229
Vegetables	0.462	0.181	0.519
Meat	0.497	-0.366	-0.103
Milk	0.494	0.096	-0.372
Fish, seafood	0.118	-0.562	0.620

Source: calculated according to 2000 data of FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (to be continued)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Albania	E	481.90	65.23	418.47	75.53	686.81	4.06
Algeria	B	591.45	104.26	238.39	51.57	161.23	10.97
Angola	B	150.11	5.06	53.47	30.93	30.75	28.14
Antigua and Barbuda	G	230.47	19.94	144.31	187.16	326.28	106.61
Argentina	D	354.02	162.06	213.51	249.15	286.31	25.74
Armenia	A	362.57	249.88	361.44	63.07	176.20	2.71
Australia	F	255.02	145.63	236.12	289.56	379.79	52.22
Austria	E	263.82	182.20	215.25	291.34	298.22	23.74
Azerbaijan	A	501.85	63.03	156.92	36.86	250.44	3.78
Bahamas	G	227.05	38.63	318.43	246.46	131.08	69.32
Bangladesh	A	449.79	25.82	29.61	8.04	33.31	23.04
Barbados	G	253.00	84.70	191.23	198.97	144.38	79.37
Belarus	E	423.89	498.63	229.89	162.81	485.55	16.21
Belgium	E	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Belize	C	302.55	31.66	91.93	113.15	169.16	26.46
Benin	B	271.22	0.16	115.36	28.32	14.45	26.28
Bermuda	C	201.41	69.98	517.80	276.94	67.61	100.60
Bolivia	D	297.50	120.77	147.95	118.35	79.12	3.62
Bosnia and Herzegovina	E	554.85	224.47	444.62	65.22	142.99	3.27
Botswana	B	339.03	25.11	66.50	88.52	247.20	8.53
Brazil	D	283.28	39.53	106.01	206.25	278.35	16.79
Brunei Darussalam	A	412.79	21.89	247.86	192.40	153.62	95.54
Bulgaria	E	444.97	81.80	355.59	161.62	258.57	3.02
Burkina Faso	B	614.85	1.31	57.93	37.97	42.58	6.29

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-1)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Burundi	B	83.97	11.19	92.00	11.72	14.22	9.31
Côte d'Ivoire	B	269.06	0.94	107.61	37.43	22.81	35.61
Cambodia	A	473.29	0.00	97.37	36.54	11.20	23.84
Cameroon	B	242.62	3.65	136.97	35.43	38.21	28.57
Canada	C	265.65	224.08	326.17	256.73	182.03	62.19
Cape Verde	B	309.96	48.34	67.02	80.33	200.09	45.41
Central African Republic	B	118.59	0.82	51.31	70.64	38.68	11.42
Chad	B	305.38	5.77	34.70	36.51	62.41	16.69
Chile	D	364.42	135.49	306.80	156.25	208.15	51.94
China	95 CHN	482.01	42.00	407.56	107.75	16.75	56.85
Colombia	D	256.42	148.13	82.54	101.76	275.60	12.43
Comoros	B	213.38	3.50	30.29	21.56	30.91	62.37
Congo	B	120.18	2.24	84.06	50.18	25.93	59.54
Congo	B	95.61	3.58	30.59	14.86	0.56	16.16
Costa Rica	C	288.76	30.28	81.55	117.07	377.28	12.81
Croatia	E	270.09	315.99	238.48	96.55	300.93	7.70
Cuba	G	261.96	64.02	124.09	65.89	125.00	37.61
Cyprus	A	315.56	81.98	443.61	272.45	342.43	63.32
Czech Republic	E	364.44	219.63	203.12	230.65	168.24	22.02
Denmark	E	300.26	203.12	196.32	278.58	224.36	69.96
Djibouti	B	285.40	7.20	99.25	41.53	156.90	3.87
Dominica	G	286.58	15.29	203.95	179.61	306.76	92.36
Dominican Republic	G	221.18	9.26	64.38	95.50	108.26	21.03
Ecuador	D	248.98	83.79	62.80	86.66	253.48	20.26
Egypt	B	703.51	57.70	411.59	53.47	30.36	24.76
El Salvador	C	421.95	5.15	77.58	43.59	163.81	8.13

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-2)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Eritrea	B	342.02	28.85	23.96	21.44	38.47	3.05
Estonia	E	388.49	382.29	145.66	134.88	555.51	57.62
Ethiopia	B	303.95	13.26	31.42	21.24	34.61	0.29
Fiji	F	396.83	49.27	92.21	117.79	149.58	85.10
Finland	E	259.12	182.95	177.86	168.52	377.75	91.25
France	95 FRA	302.08	193.78	368.87	266.86	204.93	83.13
French Polynesia	F	280.85	68.69	170.40	258.58	165.98	124.06
Gabon	B	260.81	3.14	113.11	156.03	57.09	118.73
Gambia	B	356.27	0.79	85.32	16.08	33.77	50.46
Georgia	A	499.44	115.08	231.73	75.66	242.52	3.36
Germany	E	267.53	216.59	216.63	227.82	185.34	39.24
Ghana	B	239.19	0.06	71.82	26.09	4.25	56.54
Greece	E	405.53	182.97	752.91	219.58	216.68	60.61
Grenada	G	234.46	20.16	88.48	142.09	197.47	58.41
Guatemala	C	396.49	8.99	115.71	48.10	81.61	2.90
Guinea	B	366.67	0.20	172.75	15.91	34.90	32.46
Guinea-Bissau	B	396.89	0.56	45.82	37.74	39.85	13.02
Guyana	D	381.36	18.96	42.63	69.77	141.54	158.93
Haiti	G	236.49	2.03	67.90	25.53	31.08	7.16
Honduras	C	353.25	5.50	99.88	58.57	201.42	9.35
Hungary	E	314.13	168.30	270.55	220.12	202.39	8.52
Iceland	E	240.45	156.69	120.10	191.67	328.34	249.44
India	A	441.69	36.22	150.19	12.80	114.99	11.52
Indonesia	A	502.33	12.04	115.03	26.56	8.65	47.98
Iran	A	521.25	111.29	323.84	60.80	61.49	13.91
Ireland	E	350.20	349.17	196.22	231.88	476.47	56.54

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-3)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Israel	A	405.08	113.63	677.75	181.52	197.85	66.03
Italy	E	431.25	100.17	484.40	228.92	95.48	58.32
Jamaica	G	284.63	20.77	232.56	106.34	250.39	62.78
Japan	95JPN	319.86	67.82	316.79	119.54	129.22	193.53
Jordan	A	429.90	51.41	348.70	93.72	84.58	12.73
Kazakhstan	A	666.36	199.56	143.72	148.80	411.67	6.39
Kenya	B	329.37	75.78	133.77	35.72	195.55	15.97
Kiribati	F	289.30	1.87	161.63	73.41	43.82	207.26
Korea (DPRK)	A	462.75	37.09	378.54	22.26	10.19	41.44
Korea, Republic of	95 KOR	457.93	29.37	604.13	104.35	26.11	136.00
Kuwait	A	346.76	71.26	498.79	181.59	126.88	35.55
Kyrgyzstan	A	504.41	186.30	135.48	103.26	447.41	0.59
Laos	A	488.86	14.03	57.24	39.51	12.32	26.16
Latvia	E	394.78	320.00	191.01	156.88	576.50	81.48
Lebanon	A	337.78	158.73	760.97	87.82	118.95	11.21
Lesotho	B	613.34	110.97	67.50	48.67	47.26	0.06
Liberia	B	241.39	0.30	88.52	25.64	4.89	14.40
Libyan Arab Jamahiriya	B	525.24	106.37	537.80	95.10	119.55	19.15
Lithuania	E	457.66	341.88	183.90	143.95	208.56	44.59
Madagascar	B	294.55	34.94	59.41	52.49	96.66	15.73
Malawi	B	425.11	77.40	61.78	12.96	9.75	14.64
Maldives	A	330.04	23.71	340.54	30.50	122.68	393.88
Mali	B	548.93	14.35	160.88	57.77	134.52	42.00
Malta	E	428.56	172.69	334.66	211.56	197.95	70.07
Mauritania	B	453.39	7.66	44.41	66.66	377.81	17.05
Mauritius	B	404.95	53.15	212.24	85.92	257.81	50.68

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-4)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Mexico	C	480.24	34.33	117.38	123.11	195.23	27.48
Moldova	E	507.18	187.02	244.29	61.76	347.02	6.30
Mongolia	A	357.35	35.70	27.89	240.49	273.48	0.15
Morocco	B	671.77	63.97	192.18	51.03	25.08	20.99
Mozambique	B	240.44	11.72	23.14	14.48	11.96	3.41
Myanmar	A	460.47	7.64	141.84	22.49	22.89	38.47
Namibia	B	347.16	0.00	49.11	40.30	103.01	36.40
Nepal	A	449.07	79.61	144.13	25.87	73.83	2.68
Netherlands	E	219.24	249.53	196.58	253.66	390.95	47.90
Netherlands Antilles	G	284.76	110.72	155.97	228.36	67.39	65.80
New Caledonia	F	333.74	44.67	141.77	172.79	233.04	54.85
New Zealand	F	261.74	219.21	538.16	335.87	201.81	67.21
Nicaragua	C	294.00	21.25	19.99	33.51	91.27	2.31
Niger	B	557.84	0.57	101.78	31.07	28.22	1.31
Nigeria	B	377.93	0.73	132.30	21.43	16.46	17.28
Norway	E	314.87	206.04	164.66	158.18	242.87	140.20
Occupied Palestinian Territory	A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Pakistan	A	406.41	19.53	84.60	39.82	178.51	5.77
Panama	C	308.83	18.19	78.45	141.19	139.90	35.30
Paraguay	D	207.16	0.97	139.59	236.46	223.52	13.28
Peru	D	336.08	178.40	92.50	51.48	120.26	62.23
Philippines	A	372.79	4.63	172.21	65.48	12.12	87.82
Poland	E	410.88	371.23	351.97	189.13	229.79	29.46
Portugal	E	335.20	342.70	460.85	205.00	213.58	157.93
Romania	E	496.77	194.75	390.12	149.87	455.44	8.22
Russian Federation	E	415.91	336.36	212.01	144.81	240.29	49.50

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-5)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
Rwanda	B	104.76	50.58	52.92	11.80	45.83	1.76
Saint Kitts and Nevis	G	199.56	25.49	112.64	201.42	145.63	78.46
Saint Lucia	G	262.92	32.67	67.60	240.99	173.12	60.99
Saint Vincent and Grenadines	G	269.74	3.64	80.89	175.01	88.87	35.06
Samoa	F	220.04	8.97	19.20	183.57	67.50	112.86
Sao Tome and Principe	B	295.95	1.41	114.23	21.51	3.71	85.56
Saudi Arabia	A	450.32	56.46	369.40	126.75	132.70	17.78
Senegal	B	415.37	5.39	105.38	30.55	29.13	77.87
Serbia and Montenegro	E	326.80	98.52	292.85	257.91	407.69	2.08
Seychelles	B	306.72	27.58	157.37	62.69	110.32	180.46
Sierra Leone	B	290.84	0.56	114.97	14.27	12.68	33.86
Slovakia	E	328.94	207.83	180.91	177.95	160.00	18.77
Slovenia	E	375.33	163.72	203.86	251.05	266.90	19.72
Solomon Islands	F	209.86	0.25	44.09	25.53	19.83	95.97
South Africa	B	475.21	65.80	123.96	102.26	113.58	23.93
Spain	E	276.92	235.76	409.23	277.73	302.35	115.95
Sri Lanka	A	407.47	12.55	83.70	14.61	79.23	48.80
Sudan	B	394.49	15.90	119.16	51.01	298.31	4.18
Suriname	D	401.05	25.09	187.92	88.28	75.75	36.60
Swaziland	B	377.79	32.85	70.38	68.72	111.22	0.42
Sweden	E	264.58	171.62	177.29	177.40	240.38	72.32
Switzerland	E	283.66	129.41	259.64	201.63	284.93	37.00
Syrian Arab Republic	A	480.78	64.18	292.74	50.71	157.18	2.52
Tajikistan	A	497.33	76.28	263.85	30.11	173.89	0.29
Tanzania	B	292.45	13.86	90.77	31.26	50.46	30.33
Thailand	A	332.84	8.02	115.63	78.14	25.84	88.65

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.6 Per capita daily food supply in 174 countries, 1995 (continued-6)

Unit: g/capita/day

Countries	Area	Cereals	Potatoes	Vegetables	Meat	Milk	Fish, Seafood +
The former Yugoslav Republic of Macedonia	E	395.19	133.47	474.35	101.96	41.32	11.72
Timor-Leste	A	514.82	0.37	69.48	104.15	32.01	0.00
Togo	B	314.15	0.32	90.77	17.10	11.71	30.70
Trinidad and Tobago	G	318.00	77.41	81.02	91.95	123.69	28.31
Tunisia	B	597.11	74.85	434.06	57.36	167.16	26.52
Turkey	A	621.20	164.73	620.21	53.19	289.67	26.00
Turkmenistan	A	509.53	44.43	266.83	82.55	324.75	7.10
Uganda	B	154.57	36.02	55.68	30.00	56.53	22.59
Ukraine	E	451.59	342.64	269.99	107.56	445.84	27.64
United Arab Emirates	A	321.04	62.91	660.01	258.63	270.98	62.81
United Kingdom	95 UK	257.23	300.29	211.25	201.47	333.42	50.47
United States of America	95 US	336.22	161.93	333.82	320.81	347.10	59.59
Uruguay	D	344.95	78.41	119.74	271.76	383.52	17.72
Uzbekistan	A	544.97	62.65	331.88	80.34	366.68	1.76
Vanuatu	F	190.21	100.78	87.27	92.22	53.88	91.74
Venezuela, Bolivarian Republic of	D	334.40	49.18	104.50	132.12	138.66	56.43
Viet Nam	A	477.25	9.52	145.90	51.43	3.94	45.46
Yemen	A	450.95	29.60	82.70	26.54	10.97	15.21
Zambia	B	439.07	2.56	69.09	33.10	19.05	22.75
Zimbabwe	B	408.22	5.79	30.06	26.22	34.68	8.98

Note: A: Asia, B: Africa, C: North and Central America, D: South America, G: Caribbean, E: Europe, F: Oceania, CHN: China, JPN: Japan, KOR: Korea, FRA: France, UK: United Kingdom, USA: United States of America. The numbers before countries mean the year. For example, 05 CHN means China in 2005.

Source: FAOSTAT.

Table A.7 Estimation Results of the PCA in 1995

PC	VAR(PC_i)	Contribution Proportion	Cumulative Contribution
PC1	2.379	0.397	0.397
PC2	1.377	0.230	0.626
PC3	0.956	0.159	0.786
PC4	0.584	0.097	0.883
PC5	0.412	0.069	0.952
PC6	0.291	0.049	1.000

Source: calculated according to 1995 data of FAOSTAT.

Table A.8 Coefficients of PCi (aij) in 1995 PCA results

Variable	PC1	PC2	PC3
Cereals	0.053	0.729	0.349
Potatoes	0.531	0.116	-0.179
Vegetables	0.416	0.183	0.592
Meat	0.516	-0.292	-0.096
Milk	0.509	0.094	-0.385
Fish, seafood	0.130	-0.572	0.582

Source: calculated according to 1995 data of FAOSTAT.

Appendix B Income, expenditure and food consumption data by income groups in urban and rural China

Table B.1 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1995 (to be continued)

(unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	**Income group**	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2060.96	1923.80	**Lowest (10%)**	93.14	100.71	6.43	13.21	0.97	0.66	1.63	2.62	7.49	3.37	22.21	3.50	2.56	0.19	0.09	2.84
2516.22	2505.68	**Low (10%)**	98.86	106.56	6.98	15.30	1.23	0.86	2.09	3.27	8.83	3.91	28.92	4.65	3.24	0.23	0.18	3.65
2935.16	3040.90	**Lower Middle (20%)**	96.17	110.67	6.97	16.31	1.32	0.85	2.17	3.60	9.34	4.63	33.07	5.19	3.93	0.33	0.23	4.49
3446.12	3698.41	**Middle (20%)**	95.49	116.39	7.09	17.21	1.55	0.95	2.50	3.99	9.87	4.77	37.11	6.06	4.71	0.39	0.26	5.36
4045.52	4512.50	**Upper Middle (20%)**	97.08	121.56	7.34	18.62	1.63	1.11	2.74	4.49	10.37	5.10	41.49	6.30	5.13	0.41	0.31	5.85
4665.91	5503.67	**High (10%)**	98.88	129.42	7.61	19.99	1.74	1.15	2.89	4.79	10.94	5.44	45.93	7.58	6.27	0.42	0.36	7.05
6033.10	7537.98	**Highest (10%)**	103.57	139.83	7.66	21.43	1.97	1.40	3.37	5.42	11.94	6.12	51.32	8.18	7.57	0.50	0.41	8.48

Table B.1 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1995 (continued)

Item	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
Expenditure elasticity	0.072	0.307	0.156	0.442	0.633	0.653	0.641	0.661	0.405	0.533	0.763	0.774	1.010	0.899	1.300	1.014
t-statistic	2.866	32.724	7.214	15.694	10.760	11.830	13.027	14.571	11.530	10.745	12.008	10.404	22.256	6.621	6.119	18.778
Adjusted R-squared	0.546	0.994	0.895	0.976	0.950	0.959	0.966	0.972	0.957	0.950	0.960	0.947	0.988	0.877	0.859	0.983

Source: China Statistical Yearbook 1996 and author's estimates.

Table B.2 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1996 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2327.30	2156.12	**Lowest (10%)**	95.56	104.55	6.78	13.69	1.42	0.83	2.25	2.73	7.57	3.60	26.26	3.78	2.52	0.22	0.11	2.85
2780.75	2808.52	**Low (10%)**	94.64	108.74	6.98	15.19	1.76	1.04	2.80	3.22	8.63	4.13	32.62	4.76	3.45	0.31	0.37	4.13
3265.47	3397.17	**Lower Middle (20%)**	93.32	112.52	7.08	16.07	1.84	1.20	3.04	3.63	9.27	4.49	37.27	5.41	3.93	0.37	0.23	4.53
3816.34	4146.18	**Middle (20%)**	93.37	117.48	7.31	17.24	2.05	1.28	3.33	4.02	9.71	4.82	41.34	6.00	4.84	0.42	0.33	5.59
4482.00	5075.43	**Upper Middle (20%)**	95.70	125.19	7.21	18.20	2.24	1.47	3.71	4.48	10.32	5.23	45.62	7.06	5.62	0.47	0.34	6.43
5204.35	6190.26	**High (10%)**	94.40	128.79	7.19	19.77	2.28	1.53	3.81	4.77	10.79	5.36	49.26	7.00	6.59	0.54	0.39	7.52
6485.78	8432.96	**Highest (10%)**	98.70	140.85	7.37	20.59	2.58	1.79	4.37	5.34	11.60	5.96	56.15	8.15	7.91	0.59	0.56	9.06
Expenditure elasticity			0.027	0.289	0.071	0.402	0.540	0.707	0.605	0.647	0.395	0.471	0.711	0.719	1.093	0.924	1.170	1.080
t-statistic			1.278	19.691	4.241	18.422	10.179	12.511	11.592	17.858	13.149	14.626	14.114	10.421	19.878	9.313	3.109	14.917
Adjusted R-squared			0.095	0.985	0.739	0.983	0.945	0.963	0.957	0.981	0.966	0.973	0.971	0.947	0.985	0.935	0.591	0.974

Source: China Statistical Yearbook, 1997 and author's estimates.

Table B.3 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1997 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2333.00	2430.24	**Lowest (10%)**	88.65	97.34	6.95	11.79	1.75	0.78	2.53	3.40	9.10	3.40	29.03	3.60	2.62	0.23	0.15	3.00
2895.39	3223.37	**Low (10%)**	89.76	102.76	7.32	13.33	1.99	1.02	3.01	4.05	10.10	4.00	35.94	4.72	3.49	0.34	0.27	4.10
3427.45	3966.23	**Lower Middle (20%)**	88.82	108.82	7.26	14.31	2.23	1.19	3.42	4.57	10.74	4.43	41.28	5.43	4.10	0.37	0.34	4.81
4064.55	4894.66	**Middle (20%)**	88.33	112.01	7.22	15.56	2.34	1.36	3.70	5.10	11.31	4.78	46.83	6.05	4.97	0.40	0.44	5.81
4822.15	6045.30	**Upper Middle (20%)**	87.73	119.22	7.17	16.64	2.63	1.51	4.14	5.49	11.87	5.16	51.43	7.03	6.18	0.46	0.58	7.22
5709.54	7460.70	**High (10%)**	85.66	125.81	7.24	17.75	2.80	1.71	4.51	5.88	12.21	5.76	56.21	7.93	6.38	0.52	0.61	7.51
7314.81	10250.93	**Highest (10%)**	92.61	136.40	7.32	19.25	3.07	1.93	5.00	6.40	12.95	6.07	61.73	8.75	9.02	0.61	0.78	10.41
Expenditure elasticity			0.008	0.294	0.025	0.427	0.493	0.777	0.592	0.550	0.300	0.509	0.657	0.770	1.041	0.782	1.385	1.046
t-statistic			0.307	31.236	1.484	23.897	20.349	13.815	18.712	12.487	12.878	14.634	12.742	13.782	19.648	9.913	9.186	18.922
Adjusted R-squared			-0.178	0.994	0.167	0.990	0.986	0.969	0.983	0.963	0.965	0.973	0.964	0.969	0.985	0.942	0.933	0.983

Source: China Statistical Yearbook 1998 and author's estimates.

Table B.4 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1998 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2397.60	2476.75	**Lowest (10%)**	87.27	97.82	7.13	12.43	1.48	0.78	2.26	3.13	8.25	3.71	31.20	3.75	2.87	0.24	0.28	3.39
2979.27	3303.17	**Low (10%)**	87.05	104.50	7.68	13.96	1.76	0.99	2.75	3.86	9.10	4.31	39.11	4.87	3.72	0.32	0.34	4.38
3503.24	4107.26	**Lower Middle (20%)**	87.29	108.78	7.67	14.98	1.97	1.16	3.13	4.31	10.03	4.78	43.52	5.81	4.95	0.40	0.48	5.83
4179.64	5118.99	**Middle (20%)**	86.30	114.15	7.67	16.12	2.14	1.29	3.43	4.80	10.22	5.24	48.83	6.41	6.17	0.43	0.57	7.17
4980.88	6370.59	**Upper Middle (20%)**	85.46	118.25	7.45	17.16	2.30	1.38	3.68	5.08	10.63	5.59	53.96	7.31	7.48	0.50	0.80	8.78
6003.21	7877.69	**High (10%)**	86.78	126.24	7.59	18.32	2.52	1.55	4.07	5.77	11.18	6.13	58.87	8.14	9.03	0.59	1.11	10.73
7593.95	10962.16	**Highest (10%)**	88.07	134.78	7.58	19.05	2.61	1.61	4.22	5.98	12.10	6.51	63.37	8.13	10.66	0.60	1.16	12.42
Expenditure elasticity			0.001	0.273	0.026	0.375	0.492	0.619	0.538	0.556	0.311	0.487	0.604	0.681	1.169	0.800	1.360	1.164
t-statistic			0.080	43.779	0.956	14.250	10.381	8.495	9.558	10.289	11.676	14.414	11.619	7.601	17.328	8.772	13.026	17.142
Adjusted R-squared			-0.198	0.997	-0.015	0.971	0.947	0.922	0.938	0.946	0.958	0.972	0.957	0.904	0.980	0.927	0.966	0.980

Source: China Statistical Yearbook 1999 and author's estimates.

Table B.5 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 1999 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2523.10	2617.80	**Lowest (10%)**	85.05	99.08	7.44	13.66	1.27	0.77	2.04	3.41	9.11	4.00	29.82	3.99	3.34	0.25	0.39	3.98
3137.34	3492.27	**Low (10%)**	86.84	106.53	7.84	15.32	1.54	0.95	2.49	4.12	10.00	4.78	37.08	4.97	5.14	0.32	0.52	5.98
3694.46	4363.78	**Lower Middle (20%)**	86.69	110.54	8.15	16.22	1.87	1.13	3.00	4.60	10.54	5.08	42.02	5.99	6.52	0.40	0.65	7.57
4432.48	5512.12	**Middle (20%)**	83.41	114.11	7.76	17.10	1.86	1.31	3.17	5.04	11.01	5.57	46.97	6.46	7.62	0.47	0.80	8.89
5347.09	6904.96	**Upper Middle (20%)**	82.04	120.09	7.55	17.85	2.02	1.41	3.43	5.40	11.49	5.91	51.76	6.65	9.69	0.52	1.14	11.35
6443.33	8631.94	**High (10%)**	84.22	124.77	7.78	19.09	2.18	1.48	3.66	5.95	11.88	6.34	56.83	7.45	11.00	0.56	1.32	12.88
8262.42	12083.79	**Highest (10%)**	88.90	138.20	7.84	20.16	2.38	1.59	3.97	6.30	12.97	7.01	62.64	7.75	13.78	0.62	1.47	15.87
Expenditure elasticity			0.006	0.262	0.013	0.317	0.493	0.606	0.537	0.507	0.278	0.447	0.610	0.537	1.146	0.759	1.185	1.131
t-statistic			0.205	18.466	0.419	15.511	7.480	7.627	8.003	11.031	17.345	14.208	12.877	6.797	12.605	8.640	13.363	13.080
Adjusted R-squared			-0.190	0.983	-0.159	0.976	0.902	0.905	0.913	0.953	0.980	0.971	0.965	0.883	0.963	0.925	0.967	0.966

Source: China Statistical Yearbook 2000 and author's estimates.

Table B.6 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2000 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2540.13	2653.02	**Lowest (10%)**	82.94	98.43	7.80	13.28	1.45	0.81	2.26	3.74	9.26	3.76	31.55	3.68	4.59	0.26	0.51	5.36
3274.93	3633.51	**Low (10%)**	82.94	105.04	8.31	15.07	1.67	1.05	2.72	4.60	10.30	4.42	39.07	5.23	6.04	0.36	0.62	7.02
3947.91	4623.54	**Lower Middle (20%)**	84.08	112.39	8.40	16.40	1.94	1.23	3.17	5.21	10.95	4.91	44.92	6.50	8.27	0.43	0.88	9.58
4794.56	5897.92	**Middle (20%)**	81.93	114.58	8.19	17.01	2.08	1.35	3.43	5.62	11.38	5.39	50.38	7.23	9.83	0.52	1.09	11.44
5894.92	7487.37	**Upper Middle (20%)**	80.20	118.78	8.13	17.60	2.14	1.59	3.73	5.95	11.92	5.84	55.84	7.05	11.95	0.56	1.42	13.93
7102.33	9434.21	**High (10%)**	81.64	124.95	7.89	18.71	2.21	1.59	3.80	6.31	12.08	6.07	59.47	7.51	14.07	0.67	1.52	16.26
9250.63	13311.02	**Highest (10%)**	83.44	136.72	8.16	19.78	2.39	1.98	4.37	6.88	12.89	6.76	67.18	7.99	17.52	0.70	2.06	20.28
Expenditure elasticity			-0.010	0.239	0.002	0.292	0.370	0.649	0.483	0.446	0.240	0.441	0.571	0.539	1.042	0.767	1.107	1.036
t-statistic			-0.630	16.748	0.072	10.891	7.507	12.077	10.274	9.300	10.645	14.299	13.867	4.419	19.689	9.515	17.101	19.673
Adjusted R-squared			-0.112	0.979	-0.199	0.951	0.902	0.960	0.946	0.934	0.949	0.971	0.970	0.755	0.985	0.937	0.980	0.985

Source: China Statistical Yearbook 2001 and author's estimates.

Table B.7 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2001 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2690.98	2802.83	**Lowest (10%)**	80.82	100.74	7.91	12.88	1.43	0.78	2.21	3.75	8.73	4.12	33.27	3.96	5.61	0.29	0.55	6.45
3452.27	3856.49	**Low (10%)**	82.04	108.78	8.29	14.67	1.65	1.02	2.67	4.54	9.73	4.80	41.21	5.10	7.73	0.34	0.78	8.85
4197.57	4946.60	**Lower Middle (20%)**	81.36	112.67	8.24	15.53	1.91	1.11	3.02	5.07	10.16	5.21	46.88	6.20	9.69	0.46	1.10	11.25
5131.55	6366.24	**Middle (20%)**	81.15	116.45	8.43	16.55	1.97	1.29	3.26	5.55	10.76	5.90	51.99	6.89	11.78	0.52	1.30	13.60
6241.50	8164.22	**Upper Middle (20%)**	76.32	119.51	7.93	16.70	2.13	1.48	3.61	5.77	10.81	6.05	57.10	7.01	14.79	0.56	1.69	17.04
7495.09	10374.92	**High (10%)**	76.39	124.86	7.63	17.32	2.06	1.44	3.50	6.09	11.09	6.47	62.22	7.10	16.80	0.62	2.17	19.59
9834.20	15114.85	**Highest (10%)**	79.41	135.14	7.68	18.35	2.23	1.76	3.99	6.47	11.83	6.87	68.25	7.25	19.60	0.74	2.27	22.61
Expenditure elasticity			-0.042	0.210	-0.048	0.253	0.324	0.589	0.429	0.404	0.213	0.391	0.545	0.446	0.980	0.721	1.147	0.986
t-statistic			-1.823	17.477	-1.524	8.384	5.829	10.265	8.192	8.330	8.726	10.844	13.751	4.367	16.263	11.660	11.596	15.875
Adjusted R-squared			0.279	0.981	0.181	0.920	0.846	0.946	0.917	0.919	0.926	0.951	0.969	0.751	0.978	0.957	0.957	0.977

Source: China Statistical Yearbook 2002 and author's estimates.

Table B.8 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2002 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2387.91	2408.6	**Lowest (10%)**	83.32	102.66	8.18	15.65	1.24	0.65	1.89	5.17	8.37	6.07	31.67	3.44	4.83	0.34	0.51	5.68
3259.59	3649.16	**Low (10%)**	82.28	109.08	8.81	18.28	1.61	0.82	2.43	6.99	9.82	7.69	44.45	5.00	8.39	0.42	0.98	9.79
4205.97	4931.96	**Lower Middle (20%)**	79.58	112.73	8.80	19.98	1.80	1.08	2.88	8.06	10.48	8.99	51.02	5.68	11.78	0.57	1.35	13.70
5452.94	6656.81	**Middle (20%)**	77.67	116.06	8.71	20.84	2.08	1.26	3.34	9.23	10.72	10.67	57.88	6.20	15.79	0.58	1.76	18.13
6939.95	8869.51	**Upper Middle (20%)**	77.76	121.98	8.46	21.57	2.20	1.38	3.58	10.38	11.08	12.35	64.18	6.63	19.99	0.59	2.30	22.88
8919.94	11772.82	**High (10%)**	76.75	127.16	8.45	22.79	2.19	1.32	3.51	11.87	11.56	14.79	70.66	7.49	23.63	0.68	2.74	27.05
13040.69	18995.85	**Highest (10%)**	71.36	126.56	7.79	22.38	2.18	1.21	3.39	13.34	11.06	17.24	74.69	6.36	26.46	0.65	3.31	30.42
Expenditure elasticity			-0.084	0.080	-0.037	0.207	0.326	0.394	0.350	0.545	0.158	0.623	0.488	0.362	1.005	0.383	1.073	0.990
t-statistic			-7.757	3.481	-1.227	5.221	4.364	3.307	3.899	12.674	3.732	27.861	7.515	3.423	8.460	4.475	9.098	8.580
Adjusted R-squared			0.908	0.649	0.078	0.814	0.750	0.623	0.703	0.964	0.683	0.992	0.902	0.641	0.922	0.760	0.932	0.924

Source: China Statistical Yearbook 2003 and author's estimates.

Table B.9 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2003 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2562.36	2590.17	**Lowest (10%)**	84.08	104.83	8.69	16.38	1.24	0.86	2.10	5.42	9.06	6.66	32.07	3.50	6.71	0.31	0.68	7.70
3549.28	3970.03	**Low (10%)**	82.63	111.02	9.36	18.48	1.66	1.05	2.71	7.08	10.46	8.31	44.36	5.22	10.85	0.46	1.35	12.66
4557.82	5377.25	**Lower Middle (20%)**	82.94	116.13	9.60	19.91	1.90	1.27	3.17	8.20	11.49	9.51	51.26	5.87	15.51	0.57	2.01	18.09
5848.02	7278.75	**Middle (20%)**	78.49	121.16	9.20	20.69	2.09	1.43	3.52	9.34	11.23	10.99	58.06	6.51	18.94	0.61	2.57	22.12
7547.31	9763.37	**Upper Middle (20%)**	78.67	123.72	9.39	21.77	2.30	1.57	3.87	10.42	11.78	12.44	64.39	7.16	23.43	0.62	3.11	27.16
9627.58	13123.08	**High (10%)**	77.49	124.77	9.05	22.78	2.33	1.59	3.92	11.54	12.20	14.58	70.84	6.98	26.82	0.62	3.92	31.36
14515.68	21837.32	**Highest (10%)**	69.65	117.05	8.49	22.57	2.14	1.34	3.48	12.77	11.40	16.77	75.08	6.78	28.29	0.63	4.33	33.25
Expenditure elasticity			-0.096	0.073	-0.023	0.179	0.301	0.279	0.292	0.468	0.122	0.516	0.457	0.335	0.800	0.343	0.997	0.809
t-statistic			-5.736	2.358	-0.750	5.808	3.362	2.726	3.116	9.886	2.635	19.139	7.022	3.246	6.400	3.107	6.548	6.421
Adjusted R-squared			0.842	0.432	-0.079	0.845	0.632	0.517	0.592	0.942	0.498	0.984	0.890	0.614	0.869	0.591	0.875	0.870

Source: China Statistical Yearbook 2004. and author's estimates.

Table B.10 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2004 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
2855.15	2862.39	**Lowest (10%)**	82.53	111.94	8.87	15.06	1.51	0.93	2.44	4.20	8.22	6.33	33.18	3.45	7.79	0.26	1.05	9.10
3942.23	4429.05	**Low (10%)**	82.68	116.30	9.43	16.97	1.90	1.17	3.07	5.16	9.66	7.79	44.57	5.11	12.70	0.41	1.60	14.71
5096.15	6024.10	**Lower Middle (20%)**	80.45	120.15	9.59	18.41	2.22	1.41	3.63	5.97	10.55	9.11	52.60	5.91	16.49	0.50	2.36	19.35
6498.36	8166.54	**Middle (20%)**	77.10	121.77	9.40	19.52	2.42	1.50	3.92	6.34	10.61	10.14	57.55	6.43	18.93	0.58	2.96	22.47
8345.70	11050.89	**Upper Middle (20%)**	77.56	129.49	9.47	20.95	2.63	1.62	4.25	7.25	10.98	12.04	64.72	6.50	23.18	0.57	3.56	27.31
10749.35	14970.91	**High (10%)**	75.47	130.92	9.20	21.71	2.58	1.52	4.10	7.72	11.35	13.80	70.48	6.81	26.18	0.60	3.96	30.74
16841.82	25377.17	**Highest (10%)**	68.56	124.51	8.39	21.68	2.34	1.30	3.64	8.19	10.30	15.88	73.91	6.54	28.30	0.62	4.82	33.74
Expenditure elasticity			-0.101	0.076	-0.033	0.214	0.256	0.199	0.235	0.378	0.126	0.530	0.444	0.323	0.712	0.440	0.857	0.724
t-statistic			-6.505	3.259	-1.041	6.466	2.853	1.818	2.421	8.685	2.268	19.555	6.977	3.127	6.779	3.713	8.197	6.951
Adjusted R-squared			0.873	0.616	0.014	0.872	0.543	0.277	0.448	0.925	0.409	0.985	0.888	0.594	0.882	0.681	0.917	0.887

Source: China Statistical Yearbook 2005 and author's estimates.

Table B.11 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2005 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
3111.47	3134.88	**Lowest (10%)**	80.28	105.22	8.69	15.74	1.45	0.98	2.43	5.51	8.01	6.22	31.65	2.90	7.80	0.28	1.00	9.08
4295.35	4885.32	**Low (10%)**	79.29	111.00	9.19	17.77	1.83	1.08	2.91	7.00	9.75	7.96	43.78	4.61	11.70	0.42	2.09	14.21
5574.32	6710.58	**Lower Middle (20%)**	78.42	116.87	9.39	19.64	2.22	1.39	3.61	8.31	10.38	9.22	50.37	5.73	15.30	0.51	2.55	18.36
7308.06	9190.05	**Middle (20%)**	77.42	121.07	9.62	20.88	2.48	1.55	4.03	9.26	10.89	10.62	60.03	6.32	18.69	0.54	3.51	22.74
9410.77	12603.37	**Upper Middle (20%)**	76.85	126.00	9.58	22.07	2.65	1.67	4.32	10.38	11.07	12.32	66.19	6.54	22.56	0.59	3.97	27.12
12102.51	17202.93	**High (10%)**	75.07	127.76	8.97	22.56	2.63	1.67	4.30	11.31	11.62	14.32	73.44	6.89	25.74	0.63	4.71	31.08
19153.73	28773.11	**Highest (10%)**	67.10	118.79	8.39	21.95	2.45	1.53	3.98	11.61	10.48	15.53	76.65	6.76	26.05	0.71	5.62	32.38
Expenditure elasticity			-0.086	0.084	-0.020	0.192	0.297	0.285	0.292	0.417	0.145	0.517	0.484	0.423	0.680	0.462	0.892	0.704
t-statistic			-4.423	2.647	-0.565	4.600	3.295	3.340	3.351	7.223	2.464	12.321	7.129	3.521	6.607	5.684	6.643	6.804
Adjusted R-squared			0.756	0.500	-0.128	0.771	0.622	0.629	0.630	0.895	0.458	0.962	0.893	0.655	0.877	0.839	0.878	0.883

Source: China Statistical Yearbook 2006 and author's estimates.

Table B.12 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2006 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
3422.98	3568.73	**Lowest (10%)**	104.83	8.70	16.30	1.59	0.89	2.48	5.43	8.22	6.71	34.84	3.17	8.80	0.28	1.39	10.47	104.83
4765.55	5540.71	**Low (10%)**	111.02	9.39	18.54	2.00	1.08	3.08	6.88	9.46	8.30	46.33	4.86	12.91	0.39	2.27	15.57	111.02
6108.33	7554.16	**Lower Middle (20%)**	116.13	9.75	19.43	2.34	1.40	3.74	7.78	10.40	9.53	54.80	5.86	16.26	0.47	3.13	19.86	116.13
7905.41	10269.70	**Middle (20%)**	121.16	9.82	20.55	2.65	1.49	4.14	8.54	10.91	10.84	63.35	6.69	19.16	0.55	3.87	23.58	121.16
10218.25	14049.17	**Upper Middle (20%)**	123.72	9.38	21.35	2.72	1.59	4.31	9.39	11.18	12.58	69.79	7.03	22.29	0.56	4.58	27.43	123.72
13169.82	19068.95	**High (10%)**	124.77	9.25	22.31	2.74	1.58	4.32	10.29	11.49	14.34	75.42	7.36	24.52	0.62	5.22	30.36	124.77
21061.68	31967.34	**Highest (10%)**	117.05	8.46	21.50	2.63	1.36	3.99	10.66	10.48	15.50	80.60	6.46	25.91	0.64	6.31	32.86	117.05
Expenditure elasticity			-0.080	0.073	-0.023	0.157	0.276	0.254	0.268	0.370	0.140	0.478	0.458	0.378	0.593	0.439	0.812	0.625
t-statistic			-3.990	2.358	-0.601	4.514	3.420	2.364	2.993	7.635	2.555	12.232	7.159	2.925	6.539	5.279	8.011	6.874
Adjusted R-squared			0.713	0.432	-0.119	0.764	0.641	0.433	0.570	0.905	0.479	0.961	0.893	0.557	0.874	0.817	0.913	0.885

Source: China Statistical Yearbook 2007 and author's estimates.

Table B.13 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2007 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
4036.32	4210.06	**Lowest (10%)**	N.A.	96.22	8.13	13.22	1.72	0.94	2.66	4.75	7.62	7.02	36.76	3.60	9.57	0.28	1.85	11.70
5634.15	6504.60	**Low (10%)**	N.A.	105.28	9.06	16.02	2.13	1.09	3.22	6.03	8.95	8.83	46.34	5.15	12.53	0.43	2.83	15.79
7123.69	8900.51	**Lower Middle (20%)**	N.A.	114.93	9.68	17.35	2.50	1.30	3.80	6.77	9.99	10.48	53.49	5.73	15.35	0.44	3.41	19.20
9097.35	12042.32	**Middle (20%)**	N.A.	122.04	10.05	18.69	2.75	1.47	4.22	7.29	10.96	11.77	62.14	6.47	19.16	0.48	4.22	23.86
11570.39	16385.80	**Upper Middle (20%)**	N.A.	127.98	10.22	20.05	2.94	1.55	4.49	8.27	11.48	13.81	68.42	7.01	21.02	0.51	4.61	26.14
15297.73	22233.56	**High (10%)**	N.A.	129.22	9.93	21.09	3.02	1.46	4.48	9.01	11.58	15.54	75.68	7.38	23.23	0.51	5.51	29.25
23337.33	36784.51	**Highest (10%)**	N.A.	125.48	9.61	21.51	2.97	1.42	4.39	9.70	11.24	17.22	78.89	6.78	24.89	0.52	5.94	31.35
Expenditure elasticity			N.A.	0.164	0.091	0.274	0.314	0.247	0.291	0.402	0.227	0.523	0.446	0.353	0.560	0.299	0.654	0.571
t-statistic			N.A.	4.190	2.127	6.655	4.503	3.031	3.990	9.880	3.968	12.598	8.265	3.647	7.594	3.278	7.668	7.648
Adjusted R-squared			N.A.	0.734	0.370	0.878	0.763	0.577	0.713	0.942	0.711	0.963	0.918	0.672	0.904	0.619	0.906	0.906

Source: China Statistical Yearbook 2008 and author's estimates.

Table B.14 Income, expenditure and food consumption data by 7 income groups and estimations of expenditure elasticities in urban China, 2008 (unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	Income group	Grain	Vegetables	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Beer	Liquid milk	Powder milk	Yogurt	Milk
4532.88	4753.59	**Lowest (10%)**	N.A.	100.31	8.69	13.12	1.36	0.85	2.21	5.01	8.23	6.96	32.92	3.31	7.56	0.37	1.60	9.53
6195.32	7363.28	**Low (10%)**	N.A.	113.27	9.80	16.64	1.71	0.91	2.62	6.65	9.58	8.98	42.07	4.31	10.30	0.45	2.43	13.18
7993.67	10195.56	**Lower Middle (20%)**	N.A.	119.93	10.30	18.37	2.03	1.12	3.15	7.34	10.33	10.52	49.17	4.90	13.17	0.52	2.98	16.67
10344.70	13984.23	**Middle (20%)**	N.A.	128.22	10.72	20.06	2.38	1.39	3.77	8.31	11.37	12.11	57.33	5.59	15.84	0.61	3.74	20.19
13316.63	19254.08	**Upper Middle (20%)**	N.A.	132.33	10.73	21.28	2.65	1.45	4.10	9.06	11.76	13.91	63.69	6.09	18.81	0.65	4.32	23.78
17888.18	26250.10	**High (10%)**	N.A.	135.87	10.81	23.22	2.73	1.38	4.11	10.04	12.02	15.97	68.89	6.33	20.80	0.68	5.04	26.52
26982.13	43613.75	**Highest (10%)**	N.A.	130.58	10.37	23.15	2.70	1.29	3.99	10.49	11.71	17.11	73.10	6.39	22.37	0.71	5.49	28.57
Expenditure elasticity			N.A.	0.152	0.092	0.310	0.398	0.280	0.357	0.402	0.200	0.511	0.449	0.363	0.618	0.369	0.683	0.622
t-statistic			N.A.	4.018	2.423	5.962	5.262	2.997	4.458	7.667	4.284	10.813	7.995	5.392	7.980	6.588	8.126	8.056
Adjusted R-squared			N.A.	0.716	0.448	0.852	0.816	0.571	0.759	0.906	0.743	0.951	0.913	0.824	0.913	0.876	0.916	0.914

Source: China Statistical Yearbook 2009 and author's estimates.

Table B.15 Income, expenditure and food consumption data by 5 income groups and estimations of expenditure elasticities in rural China, 2002

(Unit: yuan, kg/capita/year)

Per capita annual		Income group	Grain	Vegetables	Edible oil	Pork	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
consumption expenditure	disposable income												
1006.35	857.14	**Low (20%)**	215.40	85.77	5.85	10.95	1.04	1.42	2.72	1.57	12.10	0.97	1.16
1310.33	1547.54	**Lower Middle (20%)**	229.72	105.41	7.04	12.48	1.00	2.12	3.79	2.77	15.03	0.84	1.41
1645.04	2164.11	**Middle (20%)**	244.07	115.84	8.31	13.51	1.00	2.73	4.75	3.71	17.82	0.95	1.62
2086.61	3030.45	**Upper Middle (20%)**	243.57	124.83	8.02	14.86	1.13	3.51	5.61	5.27	22.00	0.94	1.78
3500.08	5895.63	**High (20%)**	248.77	127.36	8.89	17.75	1.80	5.40	7.11	9.69	29.58	2.47	2.43
	Expenditure elasticity		0.109	0.299	0.309	0.382	0.456	1.052	0.753	1.424	0.722	0.763	0.578
	t-statistic		3.123	3.283	3.331	24.085	3.026	12.994	7.124	13.691	19.308	2.467	21.729
	Adjusted R-squared		0.686	0.710	0.716	0.993	0.671	0.977	0.926	0.979	0.989	0.560	0.992

Source: China Yearbook of Rural Household Survey 2003 and author's estimates.

Table B.16 Income, expenditure and food consumption data by 5 income groups and estimations of expenditure elasticities in rural China, 2003

(Unit: yuan, kg/capita/year)

Per capita annual		**Income group**	Grain	Vegetables	Edible oil	Pork	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
consumption expenditure	disposable income												
1064.80	865.90	**Low (20%)**	206.30	81.20	4.50	10.90	1.20	1.60	2.90	1.70	7.30	1.60	0.90
1377.60	1606.50	**Lower Middle (20%)**	220.40	104.00	5.60	13.10	1.10	2.40	3.90	2.80	9.10	1.10	1.10
1732.70	2273.10	**Middle (20%)**	226.20	113.70	6.40	13.70	1.10	3.10	4.90	4.10	11.30	1.20	1.20
2189.30	3206.80	**Upper Middle (20%)**	233.70	120.60	7.20	14.90	1.10	3.80	5.80	5.60	13.30	1.60	1.30
3755.60	6346.90	**High (20%)**	236.30	124.00	8.10	17.20	2.00	5.70	7.30	10.30	17.80	3.50	1.70
	Expenditure elasticity		0.102	0.304	0.453	0.340	0.411	0.978	0.720	1.408	0.707	0.739	0.481
	t-statistic		3.716	2.881	5.698	7.565	2.018	9.857	7.158	13.241	12.846	2.155	13.486
	Adjusted R-squared		0.762	0.646	0.887	0.934	0.434	0.960	0.926	0.978	0.976	0.477	0.978

Source: China Yearbook of Rural Household Survey 2004 and author's estimates.

Table B.17 Income, expenditure and food consumption data by 5 income groups and estimations of expenditure elasticities in rural China, 2004

(Unit: yuan, kg/capita/year)

Per capita annual		**Income group**	Grain	Vegetables	Edible oil	Pork	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
consumption expenditure	isposable income												
1248.30	1006.90	**Low (20%)**	199.50	81.80	3.80	10.90	1.20	1.70	2.60	1.80	8.20	1.60	0.90
1581.00	1842.00	**Lower Middle (20%)**	214.80	101.50	4.70	12.50	1.10	2.40	3.70	2.80	10.40	1.40	1.00
1951.50	2578.50	**Middle (20%)**	221.40	112.20	5.40	13.60	1.10	3.00	4.60	3.80	11.70	1.50	1.10
2459.60	3607.70	**Upper Middle (20%)**	229.80	119.50	6.00	14.80	1.20	3.70	5.60	5.40	13.20	1.80	1.20
4129.10	6930.70	**High (20%)**	230.90	124.70	7.20	16.40	2.00	5.40	7.30	9.90	17.10	3.90	1.40
	Expenditure elasticity		0.115	0.325	0.516	0.332	0.453	0.942	0.836	1.408	0.590	0.800	0.368
	t-statistic		3.240	3.290	7.607	7.178	2.511	10.984	7.020	17.495	10.958	3.155	16.028
	Adjusted R-squared		0.704	0.711	0.934	0.927	0.570	0.968	0.923	0.987	0.968	0.691	0.985

Source: China Yearbook of Rural Household Survey 2005 and author's estimates.

Table B.18 Income, expenditure and food consumption data by income groups and estimations of expenditure elasticities in rural China, 2005

(Unit: yuan, kg/capita/year)

Per capita annual		**Income group**	Grain	Vegetables	Edible oil	Pork	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
consumption expenditure	disposable income												
1548.30	1067.20	**Low (20%)**	197.80	81.80	4.80	13.00	1.40	2.10	2.70	2.10	8.30	2.20	0.90
1913.10	2018.30	**Lower Middle (20%)**	205.20	97.80	5.40	14.60	1.20	2.90	3.80	3.10	10.10	2.20	1.10
2327.70	2851.00	**Middle (20%)**	212.00	106.10	6.10	17.20	1.30	3.60	4.70	4.30	11.60	2.50	1.10
2879.10	4003.30	**Upper Middle (20%)**	216.20	112.90	6.60	16.20	1.40	4.30	5.50	6.00	13.90	2.90	1.20
4593.00	7747.40	**High (20%)**	216.10	118.50	7.50	17.90	2.20	6.20	7.50	10.60	17.80	5.10	1.40
	Expenditure elasticity		0.080	0.317	0.407	0.270	0.467	0.966	0.902	1.481	0.698	0.803	0.369
	t-statistic		3.088	3.736	8.605	2.999	2.512	11.106	8.062	17.946	14.471	5.717	6.027
	Adjusted R-squared		0.681	0.764	0.948	0.666	0.570	0.968	0.941	0.988	0.981	0.888	0.898

Source: China Yearbook of Rural Household Survey 2006 and author's estimates.

Table B.19 Income, expenditure and food consumption data by 5 income groups and estimations of expenditure elasticities in rural China, 2006

(Unit: yuan, kg/capita/year)

Per capita annual consumption expenditure	Per capita annual disposable income	**Income group**	Grain	Vegetables	Edible oil	Vegetable oil	Pork	Beef	Mutton	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
1624.73	1182.46	**Low (20%)**	191.30	82.00	4.70	3.78	13.30	0.52	0.91	1.43	1.98	3.00	2.10	12.11	2.10	0.90
2039.13	2222.03	**Lower Middle (20%)**	202.70	96.50	5.30	4.18	14.60	0.51	0.67	1.18	2.73	4.00	3.10	15.47	2.20	1.00
2567.92	3148.50	**Middle (20%)**	208.90	103.40	5.90	4.61	15.20	0.58	0.77	1.35	3.37	5.10	4.30	18.64	2.70	1.10
3230.35	4446.59	**Upper Middle (20%)**	215.00	111.20	6.50	5.20	16.40	0.79	0.90	1.69	4.20	5.90	6.10	22.56	3.30	1.10
5276.75	8474.79	**High (20%)**	214.00	115.00	7.30	6.26	18.60	1.03	1.31	2.34	5.89	7.90	11.00	29.54	6.00	1.30
Expenditure elasticity			0.091	0.270	0.373	0.432	0.278	0.647	0.410	0.507	0.905	0.801	1.399	0.748	0.920	0.294
t-statistic			2.897	3.831	9.366	32.899	18.388	6.117	1.912	3.090	11.727	9.076	23.920	12.144	8.454	8.135
Adjusted R-squared			0.649	0.774	0.956	0.996	0.988	0.901	0.399	0.681	0.972	0.953	0.993	0.973	0.946	0.942

Source: China Yearbook of Rural Household Survey 2007 and author's estimates.

Table B.20 Income, expenditure and food consumption data by 5 income groups and estimations of expenditure elasticities in rural China, 2007

(Unit: yuan, kg/capita/year)

Per capita annual		**Income group**	Grain	Vegetables	Edible oil	Pork	Beef & mutton	Poultry	Eggs	Aquatic products	Fruits	Milk	Sugar
consumption expenditure	disposable income												
1850.60	1346.90	**Low (20%)**	185.30	78.20	4.70	11.50	1.30	2.30	2.70	2.30	8.90	2.40	0.90
2357.90	2581.70	**Lower Middle (20%)**	196.40	93.20	5.30	12.70	1.20	3.00	3.80	3.50	10.80	2.60	1.00
2938.50	3658.80	**Middle (20%)**	204.00	102.20	6.10	13.10	1.30	3.80	4.70	4.80	12.70	3.10	1.00
3682.70	5129.80	**Upper Middle (20%)**	208.50	110.70	6.60	14.40	1.60	4.70	5.60	6.40	14.70	3.80	1.10
5994.40	9790.70	**High (20%)**	207.00	117.40	7.60	16.00	2.30	6.30	7.50	11.30	20.10	6.40	1.30
		Expenditure elasticity	0.090	0.332	0.410	0.277	0.539	0.858	0.844	1.336	0.688	0.859	0.302
		t-statistic	2.642	4.569	9.616	12.677	4.048	11.524	8.717	19.527	33.628	10.091	9.562
		Adjusted R-squared	0.599	0.832	0.958	0.976	0.794	0.971	0.949	0.990	0.996	0.962	0.958

Source: China Yearbook of Rural Household Survey 2008 and author's estimates.

Table B.21 Income, expenditure and food consumption data by 9 income groups in rural China, 1980

(Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤60 yuan	52.70	79.10	185.90	65.20	1.00	N.A.	3.00	N.A.	0.20	0.50	0.40	N.A.
60-80 yuan	72.70	84.00	203.10	78.70	1.30	N.A.	3.40	N.A.	0.30	0.60	0.50	N.A.
80-100 yuan	91.80	94.00	218.80	91.70	1.60	N.A.	4.10	N.A.	0.30	0.60	0.50	N.A.
100-150 yuan	126.40	118.10	248.60	110.50	2.10	N.A.	5.60	N.A.	0.40	0.70	0.70	N.A.
150-200 yuan	174.00	151.50	273.30	128.10	2.80	N.A.	7.50	N.A.	0.60	1.00	1.00	N.A.
200-250 yuan	223.40	185.10	299.90	143.10	3.30	N.A.	8.90	N.A.	0.80	1.30	1.30	N.A.
250-300 yuan	271.90	218.90	309.00	154.60	4.10	N.A.	10.60	N.A.	1.00	2.00	1.50	N.A.
300-500 yuan	365.30	273.50	312.40	163.30	4.40	N.A.	12.70	N.A.	1.20	2.20	2.10	N.A.
≥500 yuan	600.40	395.20	327.80	181.40	5.10	N.A.	16.20	N.A.	1.40	2.80	3.30	N.A.

Source: China Yearbook of Rural Household Survey 2004 and author's estimates.

Table B.22 Income, expenditure and food consumption data by 12 income groups in rural China, 1985

(Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	72.20	179.20	213.10	88.00	2.60	NA	4.90	NA	0.30	1.20	0.50	NA
100-150 yuan	133.30	169.90	209.10	87.30	2.40	NA	5.70	NA	0.40	0.90	0.60	NA
150-200 yuan	179.80	191.10	222.90	95.30	2.70	NA	6.80	NA	0.50	1.00	0.80	NA
200-300 yuan	252.40	236.20	243.90	116.70	3.30	NA	8.90	NA	0.70	1.40	1.00	NA
300-400 yuan	347.70	297.30	265.60	133.70	4.10	NA	10.80	NA	1.00	1.90	1.40	NA
400-500 yuan	444.20	357.00	275.70	146.10	4.60	NA	12.30	NA	1.20	2.50	1.70	NA
500-600 yuan	542.40	419.80	279.00	153.10	5.10	NA	13.90	NA	1.40	2.90	1.90	NA
600-800 yuan	680.60	502.30	275.20	157.10	5.40	NA	14.90	NA	1.70	3.40	2.30	NA
800-1000 yuan	878.90	614.80	278.30	157.70	5.60	NA	16.70	NA	2.00	4.20	2.70	NA
1000-1500 yuan	1157.20	756.30	276.90	158.20	6.00	NA	18.30	NA	2.80	4.70	3.30	NA
1500-2000 yuan	1686.60	1080.90	263.60	160.80	6.10	NA	19.20	NA	3.90	5.30	3.50	NA
≤ 2000 yuan	2538.20	1461.70	242.40	171.30	6.00	NA	22.70	NA	7.00	5.00	6.30	NA

Source: China Yearbook of Rural Household Survey 2004.

Table B.23 Income, expenditure and food consumption data by 12 income groups in rural China, 1990

(Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	66.10	363.70	220.40	105.10	4.20	NA	1.80	NA	0.50	1.70	0.80	NA
100-150 yuan	133.10	295.10	217.10	87.10	3.30	NA	1.00	NA	0.40	1.30	0.70	NA
150-200 yuan	181.20	269.20	208.90	81.80	3.00	NA	1.10	NA	0.40	1.30	0.70	NA
200-300 yuan	257.70	311.20	225.00	91.10	3.30	NA	1.60	NA	0.50	1.20	0.80	NA
300-400 yuan	351.90	363.50	241.10	106.90	3.80	NA	1.80	NA	0.60	1.40	0.90	NA
400-500 yuan	450.10	429.60	259.10	121.10	4.40	NA	1.60	NA	0.80	1.80	1.10	NA
500-600 yuan	548.20	500.90	272.80	130.70	4.90	NA	1.50	NA	1.00	2.00	1.30	NA
600-800 yuan	691.90	590.70	284.60	144.50	5.60	NA	1.90	NA	1.30	2.50	1.60	NA
800-1000 yuan	889.40	723.20	291.00	157.30	6.30	NA	2.10	NA	1.60	3.00	2.00	NA
1000-1500 yuan	1195.80	902.50	288.10	162.80	7.00	NA	2.50	NA	2.10	4.00	2.20	NA
1500-2000 yuan	1714.40	1240.10	283.00	164.50	7.50	NA	1.60	NA	3.20	4.90	2.80	NA
≥ 2000 yuan	2611.60	1754.50	287.20	164.60	8.00	NA	3.00	NA	4.60	6.40	3.40	NA

Source: China Yearbook of Rural Household Survey 2004.

Table B.24 Income, expenditure and food consumption data by 20 income groups in rural China, 1995 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	-77.20	1151.00	287.40	83.30	5.40	NA	7.30	NA	0.80	2.60	1.10	NA
100-200 yuan	153.00	732.10	218.40	59.30	4.50	NA	5.60	NA	0.50	1.70	1.00	NA
200-300 yuan	258.70	702.20	209.40	58.90	4.10	NA	6.40	NA	0.70	1.50	0.90	NA
300-400 yuan	353.40	672.90	211.60	62.50	4.30	NA	7.40	NA	0.60	1.30	0.90	NA
400-500 yuan	451.60	708.50	214.70	154.50	3.90	NA	7.90	NA	0.60	1.30	1.00	NA
500-600 yuan	551.00	745.40	223.50	74.50	4.20	NA	8.50	NA	0.80	1.50	1.00	NA
600-800 yuan	704.70	832.30	228.30	82.90	4.40	NA	9.40	NA	0.80	1.80	0.90	NA
800-1000 yuan	902.10	909.90	239.80	92.10	5.00	NA	10.00	NA	1.00	2.10	1.00	NA
1000-1200 yuan	1097.00	1019.80	252.20	99.40	5.40	NA	10.20	NA	1.30	2.50	1.20	NA
1200-1300 yuan	1248.30	1106.60	262.90	105.40	5.60	NA	10.20	NA	1.50	2.90	1.30	NA
1300-1500 yuan	1396.80	1175.30	264.20	110.20	6.00	NA	11.20	NA	1.60	3.10	1.30	NA
1500-1700 yuan	1596.00	1301.90	269.00	117.30	6.10	NA	11.50	NA	1.80	3.50	1.40	NA
1700-2000 yuan	1839.20	1501.90	272.90	120.80	6.50	NA	12.20	NA	2.30	4.10	1.40	NA
2000-2500 yuan	2228.60	1662.20	274.90	125.70	7.00	NA	13.10	NA	2.50	4.70	1.60	NA
2500-3000 yuan	2723.10	1937.70	274.60	128.50	7.40	NA	14.20	NA	3.20	5.00	1.70	NA
3000-3500 yuan	3223.40	2223.10	272.00	128.00	7.60	NA	15.10	NA	3.70	5.50	1.90	NA
3500-40000 yuan	3726.80	2487.90	280.80	124.00	7.60	NA	15.70	NA	4.40	5.80	2.10	NA
40000-4500 yuan	4233.60	2867.80	282.50	126.70	8.10	NA	17.30	NA	5.10	6.30	2.10	NA
4500-5000 yuan	4740.40	3310.40	274.70	122.90	7.70	NA	18.70	NA	5.80	6.20	2.30	NA
≥5000 yuan	6833.30	4292.20	274.50	123.40	8.20	NA	19.90	NA	6.70	7.00	2.70	NA

Source: China Yearbook of Rural Household Survey 2004.

Table B.25 Income, expenditure and food consumption data by 20 income groups in rural China, 1998 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	-404.59	1381.85	241.63	83.33	5.93	NA	6.67	NA	2.10	6.36	0.89	NA
100-200 yuan	158.00	1107.12	221.11	63.39	4.72	NA	9.25	NA	1.15	2.20	0.90	NA
200-300 yuan	255.50	943.42	273.98	65.56	4.48	NA	8.18	NA	0.80	2.26	0.68	NA
300-400 yuan	354.80	799.04	210.48	61.63	3.95	NA	7.63	NA	0.56	1.88	0.79	NA
400-500 yuan	453.82	786.87	214.85	64.00	4.17	NA	8.42	NA	0.70	1.60	0.68	NA
500-600 yuan	551.92	782.35	216.17	64.26	4.25	NA	8.85	NA	0.67	1.61	0.82	NA
600-800 yuan	707.49	840.24	221.51	67.46	4.27	NA	9.23	NA	0.85	0.70	0.86	NA
800-1000 yuan	905.45	937.01	227.75	82.48	4.58	NA	10.39	NA	1.00	2.04	0.99	NA
1000-1200 yuan	1100.98	1014.27	232.76	87.75	4.86	NA	10.39	NA	1.10	2.34	1.11	NA
1200-1300 yuan	1248.59	1102.08	236.39	94.11	5.21	NA	10.39	NA	1.23	2.82	1.20	NA
1300-1500 yuan	1399.75	1167.28	244.50	100.40	5.39	NA	10.39	NA	1.53	3.04	1.26	NA
1500-1700 yuan	1597.64	1266.23	251.44	105.78	5.65	NA	10.39	NA	1.78	3.43	1.24	NA
1700-2000 yuan	1845.24	1401.61	253.99	110.49	5.95	NA	10.39	NA	2.06	3.96	1.32	NA
2000-2500 yuan	2232.30	1615.21	259.28	117.78	6.47	NA	10.39	NA	2.59	4.59	1.47	NA
2500-3000 yuan	2728.90	1815.42	258.28	117.38	6.80	NA	13.71	NA	2.90	5.26	1.57	NA
3000-3500 yuan	3228.27	2112.92	263.25	121.25	7.35	NA	15.11	NA	3.55	5.82	1.82	NA
3500-40000 yuan	3731.00	2334.60	263.37	120.77	7.48	NA	15.74	NA	3.89	6.12	1.84	NA
40000-4500 yuan	4233.83	2723.84	263.20	128.99	7.80	NA	16.91	NA	4.38	6.82	2.09	NA
4500-5000 yuan	4728.82	2928.29	268.72	123.88	8.04	NA	17.62	NA	4.99	6.94	2.16	NA
≥5000 yuan	7202.31	4299.95	263.63	125.65	8.41	NA	18.89	NA	5.98	7.29	2.40	NA

Source: China Yearbook of Rural Household Survey 2000.

Table B.26 Income, expenditure and food consumption data by 20 income groups in rural China, 1999 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-300.40	1413.40	235.92	91.56	5.72	NA	11.50	NA	0.83	4.35	1.06	NA
100-200 yuan	156.76	994.34	219.18	72.35	5.75	NA	8.12	NA	0.77	2.11	0.95	NA
200-300 yuan	250.26	790.51	213.67	55.59	4.33	NA	8.75	NA	0.53	2.02	0.64	NA
300-400 yuan	354.07	706.87	206.17	59.51	4.06	NA	7.55	NA	0.46	1.95	0.67	NA
400-500 yuan	453.51	752.22	202.26	57.76	4.03	NA	7.84	NA	0.53	1.66	0.72	NA
500-600 yuan	552.70	785.99	210.33	67.24	4.27	NA	9.55	NA	0.64	1.65	0.82	NA
600-800 yuan	707.57	829.74	216.57	67.51	4.58	NA	10.41	NA	0.72	1.72	0.94	NA
800-1000 yuan	904.20	907.83	223.68	79.95	4.96	NA	11.35	NA	0.87	2.20	1.03	NA
1000-1200 yuan	1101.97	1004.36	232.33	90.77	5.09	NA	12.40	NA	1.32	2.62	1.16	NA
1200-1300 yuan	1250.86	1079.63	239.68	97.17	5.19	NA	12.48	NA	1.44	3.10	1.26	NA
1300-1500 yuan	1400.31	1151.35	241.78	103.15	5.59	NA	12.79	NA	1.63	3.26	1.26	NA
1500-1700 yuan	1598.28	1264.55	248.93	109.65	5.96	NA	12.98	NA	1.92	3.60	1.39	NA
1700-2000 yuan	1845.90	1355.03	252.48	113.80	6.06	NA	13.57	NA	2.18	4.07	1.42	NA
2000-2500 yuan	2234.76	1535.01	257.41	118.58	6.56	NA	13.84	NA	2.61	4.84	1.50	NA
2500-3000 yuan	2729.32	1802.10	262.37	126.21	6.84	NA	15.03	NA	3.11	5.54	1.62	NA
3000-3500 yuan	3229.14	2096.21	261.74	128.10	7.31	NA	16.11	NA	3.59	5.81	1.85	NA
3500-40000 yuan	3727.85	2322.54	264.21	128.73	7.48	NA	16.94	NA	4.04	6.19	1.81	NA
40000-4500 yuan	4232.53	2570.92	261.35	131.20	7.71	NA	18.01	NA	4.40	6.47	1.97	NA
4500-5000 yuan	4732.21	2978.08	257.71	133.42	7.64	NA	18.68	NA	5.22	7.62	2.15	NA
≥ 5000 yuan	7247.73	3945.84	257.50	126.71	8.12	NA	19.55	NA	6.65	7.60	2.45	NA

Source: China Yearbook of Rural Household Survey 2000.

Table B.27 Income, expenditure and food consumption data by 20 income groups in rural China, 2000 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	-561.64	1605.60	239.20	90.50	6.70	NA	13.24	NA	2.18	5.62	1.14	NA
100-200 yuan	155.33	987.20	207.44	63.83	3.92	NA	9.48	NA	0.63	2.85	0.60	NA
200-300 yuan	253.31	815.76	210.69	50.68	4.64	NA	8.57	NA	0.86	2.15	0.75	NA
300-400 yuan	352.89	850.20	215.12	58.19	4.74	NA	8.38	NA	0.89	2.09	0.75	NA
400-500 yuan	454.42	883.38	216.17	71.10	4.91	NA	9.35	NA	0.91	2.12	0.73	NA
500-600 yuan	552.11	831.92	213.17	70.66	4.75	NA	10.04	NA	0.97	2.19	0.81	NA
600-800 yuan	705.18	901.17	222.96	78.11	5.35	NA	10.85	NA	1.06	2.36	0.82	NA
800-1000 yuan	902.77	982.26	231.60	84.74	5.43	NA	11.65	NA	1.34	3.11	0.99	NA
1000-1200 yuan	1101.55	1091.91	235.61	93.04	5.86	NA	12.64	NA	1.45	3.18	1.09	NA
1200-1300 yuan	1249.95	1132.76	240.89	99.54	6.27	NA	12.77	NA	1.73	3.50	1.09	NA
1300-1500 yuan	1400.58	1209.46	242.97	105.77	6.40	NA	13.31	NA	2.02	3.93	1.14	NA
1500-1700 yuan	1598.33	1315.95	247.65	112.61	6.91	NA	13.78	NA	2.17	4.29	1.20	NA
1700-2000 yuan	1846.39	1425.54	254.59	115.28	7.22	NA	13.97	NA	2.61	4.72	1.30	NA
2000-2500 yuan	2236.31	1621.86	256.95	120.63	5.35	NA	14.57	NA	2.84	5.41	1.29	NA
2500-3000 yuan	2735.98	1843.11	264.64	125.22	5.43	NA	15.85	NA	3.40	6.08	1.46	NA
3000-3500 yuan	3233.75	2142.20	261.89	128.67	5.86	NA	16.70	NA	4.08	6.73	1.49	NA
3500-40000 yuan	3732.55	2377.72	260.95	132.14	6.27	NA	18.01	NA	4.51	6.63	1.47	NA
40000-4500 yuan	4234.33	2690.40	268.13	138.13	6.40	NA	18.86	NA	5.18	7.06	1.74	NA
4500-5000 yuan	4729.88	2883.05	266.57	137.71	6.91	NA	19.62	NA	5.01	7.63	1.63	NA
≥ 5000 yuan	7394.58	4098.63	262.79	140.81	7.22	NA	22.26	NA	7.03	9.06	1.93	NA

Source: China Yearbook of Rural Household Survey 2001.

Table B.28 Income, expenditure and food consumption data by 20 income groups in rural China, 2001 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-608.86	1504.31	224.95	85.15	5.08	NA	12.54	NA	1.52	3.89	1.22	NA
100-200 yuan	153.97	1003.89	205.46	72.08	5.98	NA	9.65	NA	0.89	3.30	0.70	NA
200-300 yuan	253.08	960.58	198.10	64.83	5.19	NA	8.09	NA	0.81	2.36	0.87	NA
300-400 yuan	353.23	772.27	197.67	60.16	4.73	NA	8.46	NA	0.82	1.89	0.69	NA
400-500 yuan	454.43	801.81	199.87	57.45	4.65	NA	8.27	NA	0.82	1.68	0.74	NA
500-600 yuan	553.37	879.32	207.95	68.71	5.09	NA	9.79	NA	0.97	3.03	1.19	NA
600-800 yuan	706.25	906.48	217.49	73.54	5.52	NA	10.97	NA	1.10	2.28	0.83	NA
800-1000 yuan	902.53	958.39	217.21	83.50	5.41	NA	12.00	NA	1.28	2.53	0.93	NA
1000-1200 yuan	1101.27	1080.11	224.52	94.79	6.01	NA	12.48	NA	1.54	2.96	1.13	NA
1200-1300 yuan	1251.03	1149.50	228.56	96.83	6.14	NA	12.52	NA	1.76	3.45	1.30	NA
1300-1500 yuan	1399.90	1220.23	229.15	101.91	6.57	NA	13.41	NA	2.03	3.45	1.20	NA
1500-1700 yuan	1599.10	1319.69	239.67	107.51	6.71	NA	13.82	NA	2.19	3.96	1.46	NA
1700-2000 yuan	1846.62	1440.35	239.18	114.38	7.03	NA	13.87	NA	2.47	4.40	1.44	NA
2000-2500 yuan	2237.68	1651.78	244.52	118.10	7.22	NA	14.28	NA	2.84	5.13	1.43	NA
2500-3000 yuan	2734.19	1868.11	247.58	121.13	7.52	NA	15.60	NA	3.35	5.52	1.75	NA
3000-3500 yuan	3233.70	2083.28	248.84	128.97	7.99	NA	16.32	NA	3.81	5.98	1.47	NA
3500-40000 yuan	3732.85	2422.50	252.60	123.31	8.24	NA	17.22	NA	4.30	6.50	1.66	NA
40000-4500 yuan	4228.96	2627.92	252.29	128.72	8.39	NA	17.89	NA	4.70	6.68	1.70	NA
4500-5000 yuan	4732.81	2935.09	251.09	125.94	8.71	NA	18.45	NA	5.29	6.70	1.85	NA
≥5000 yuan	7473.80	4271.79	260.14	127.61	8.96	NA	20.53	NA	6.55	8.65	2.18	NA

Source: China Yearbook of Rural Household Survey 2002.

Table B.29 Income, expenditure and food consumption data by 20 income groups in rural China, 2002 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-625.71	1700.58	213.25	100.08	6.62	18.80	13.03	0.83	2.26	7.73	1.09	3.03
100-200 yuan	154.27	1088.67	190.62	78.49	5.40	9.60	10.22	0.69	1.63	2.53	0.91	2.28
200-300 yuan	254.93	990.37	201.22	69.57	4.80	16.47	8.49	0.78	0.97	2.09	0.93	1.32
300-400 yuan	354.79	912.10	207.34	61.74	5.02	8.11	9.13	1.21	0.94	2.04	0.92	1.33
400-500 yuan	453.28	825.54	194.10	67.56	4.65	9.86	9.92	0.90	0.93	1.80	1.51	1.13
500-600 yuan	552.47	809.31	199.31	64.15	5.35	9.39	10.37	1.42	0.92	1.82	0.87	0.93
600-800 yuan	704.63	886.10	211.26	76.76	5.47	10.40	10.90	1.21	1.22	2.05	0.90	1.20
800-1000 yuan	902.37	982.86	218.36	86.83	6.15	12.66	12.00	1.01	1.40	2.47	1.39	1.46
1000-1200 yuan	1100.62	1091.87	221.58	95.13	6.01	12.96	13.23	0.82	1.66	3.34	1.17	1.87
1200-1300 yuan	1250.76	1172.40	223.69	101.09	6.53	13.16	13.30	0.81	1.84	3.22	1.60	2.07
1300-1500 yuan	1399.98	1221.33	228.01	100.28	6.71	14.27	13.17	0.71	1.90	3.68	1.24	2.39
1500-1700 yuan	1599.75	1361.97	229.08	108.01	6.89	15.48	13.56	0.96	2.22	3.79	1.49	3.05
1700-2000 yuan	1847.71	1452.28	236.23	112.42	7.56	16.02	14.04	0.77	2.46	4.15	1.50	3.21
2000-2500 yuan	2237.49	1696.08	246.39	116.50	8.74	18.46	14.63	1.03	2.77	4.94	1.61	3.82
2500-3000 yuan	2734.30	1920.12	242.43	120.93	7.93	20.88	15.46	0.95	3.27	5.33	1.75	4.81
3000-3500 yuan	3230.91	2189.69	245.19	128.08	8.14	23.05	16.37	0.95	3.61	5.76	1.61	5.44
3500-40000 yuan	3730.76	2432.54	247.90	129.47	7.97	24.25	17.02	1.22	4.07	6.12	2.63	6.73
40000-4500 yuan	4235.21	2681.88	249.49	128.37	9.04	26.48	17.69	1.50	4.27	6.49	1.69	7.40
4500-5000 yuan	4738.40	2970.69	252.13	126.76	8.88	29.38	18.41	2.02	5.02	6.30	1.63	8.91
≥ 5000 yuan	7656.88	4365.01	249.60	126.47	9.14	32.53	21.51	3.36	6.47	7.96	2.85	11.90

Source: China Yearbook of Rural Household Survey 2003 and author's estimates.

Table B.30 Income, expenditure and food consumption data by 20 income groups in rural China, 2003 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	-776.60	1948.80	213.50	87.90	5.80	11.30	10.80	2.80	2.30	4.50	1.00	4.00
100-200 yuan	149.60	1258.90	202.80	64.00	4.50	6.50	9.80	1.60	1.60	2.90	1.00	2.20
200-300 yuan	256.50	995.70	193.50	67.10	4.40	7.20	9.60	2.10	1.30	2.40	0.90	1.70
300-400 yuan	353.50	1017.70	200.90	64.30	4.20	6.70	8.60	1.10	1.50	2.80	0.70	1.60
400-500 yuan	454.30	851.10	183.00	62.40	4.10	5.50	9.80	2.10	1.30	2.50	0.70	1.20
500-600 yuan	553.20	900.10	198.80	70.10	3.90	6.00	10.70	1.40	1.30	2.40	0.80	1.20
600-800 yuan	705.00	939.00	200.40	73.30	4.20	6.70	10.70	1.80	1.40	2.60	0.90	1.40
800-1000 yuan	902.00	1041.20	209.20	81.20	4.50	7.20	12.00	1.40	1.50	2.80	0.90	1.60
1000-1200 yuan	1103.50	1097.10	210.10	88.00	4.70	7.50	13.30	1.40	1.80	3.10	1.00	2.00
1200-1300 yuan	1249.90	1199.30	212.40	91.80	4.80	8.20	13.60	1.50	1.90	3.10	1.00	2.10
1300-1500 yuan	1397.90	1261.00	219.50	98.30	5.10	8.30	13.60	1.00	2.20	3.50	1.00	2.30
1500-1700 yuan	1600.90	1392.90	218.80	106.00	5.70	9.40	14.40	1.20	2.40	3.80	1.10	2.90
1700-2000 yuan	1847.60	1500.70	223.10	108.60	6.10	9.60	14.50	1.10	2.60	4.40	1.20	3.30
2000-2500 yuan	2242.00	1704.80	225.40	113.50	6.40	11.20	14.70	1.10	3.00	4.90	1.20	4.10
2500-3000 yuan	2738.80	1987.00	231.80	118.00	6.80	12.60	15.50	1.50	3.50	5.40	1.30	4.70
3000-3500 yuan	3232.90	2213.90	235.70	120.30	7.30	13.50	16.10	1.40	3.90	5.90	1.30	5.70
3500-40000 yuan	3735.10	2412.40	232.50	123.00	7.60	14.40	16.70	1.90	4.30	6.20	1.40	6.40
40000-4500 yuan	4232.90	2675.60	241.90	123.90	7.60	14.80	16.90	2.00	4.60	6.40	1.40	6.90
4500-5000 yuan	4737.30	2923.40	234.80	125.50	8.10	16.80	18.20	2.30	4.90	6.80	1.50	8.30
≥ 5000 yuan	7790.30	4493.90	234.90	123.60	8.30	19.30	20.40	4.50	6.50	7.80	1.90	12.50

Source: China Yearbook of Rural Household Survey 2004.

Table B.31 Income, expenditure and food consumption data by 20 income groups in rural China, 2004 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-732.80	2638.90	191.90	88.80	6.00	13.20	15.30	4.10	2.80	5.00	1.20	5.30
100-200 yuan	146.20	1622.60	198.20	63.60	4.70	8.70	10.50	3.10	2.60	2.40	1.00	3.10
200-300 yuan	254.10	1491.90	206.40	77.00	5.40	7.80	9.60	1.10	1.60	3.50	0.80	2.00
300-400 yuan	352.90	1242.40	178.80	67.20	3.90	8.90	9.50	1.50	1.40	2.20	0.70	1.60
400-500 yuan	453.70	968.10	178.10	62.60	3.40	7.80	9.20	1.70	1.30	2.10	0.70	1.60
500-600 yuan	554.10	979.40	185.60	67.80	2.90	6.90	9.60	1.50	1.30	2.10	0.60	1.30
600-800 yuan	706.90	1034.40	190.40	70.60	3.30	7.70	11.10	1.60	1.40	2.00	0.80	1.50
800-1000 yuan	900.70	1218.60	195.50	79.00	3.50	7.40	11.90	1.70	1.50	2.30	0.80	1.70
1000-1200 yuan	1106.10	1206.30	204.00	81.50	3.70	7.70	11.80	1.60	1.60	2.50	0.90	1.70
1200-1300 yuan	1250.30	1281.00	206.90	88.10	4.00	8.50	12.90	1.40	1.80	2.80	0.90	1.80
1300-1500 yuan	1400.70	1371.30	206.30	92.80	4.10	9.20	13.20	1.60	1.90	3.00	1.00	2.10
1500-1700 yuan	1600.50	1460.70	214.00	97.80	4.30	9.90	13.30	1.60	2.20	3.40	1.00	2.30
1700-2000 yuan	1848.80	1577.10	213.50	100.30	4.70	10.40	13.50	1.50	2.30	3.70	1.10	2.90
2000-2500 yuan	2241.50	1787.20	218.40	109.10	5.20	11.10	14.30	1.50	2.80	4.20	1.10	3.30
2500-3000 yuan	2739.50	2033.20	223.10	113.60	5.50	12.00	14.90	1.40	3.10	4.80	1.20	4.00
3000-3500 yuan	3236.60	2268.80	228.50	118.10	5.80	12.20	15.80	1.60	3.50	5.50	1.20	4.70
3500-40000 yuan	3737.80	2543.70	228.20	120.30	6.10	14.00	16.00	1.90	3.80	5.50	1.20	5.80
40000-4500 yuan	4237.40	2777.50	233.30	121.70	6.50	14.30	16.40	2.10	4.10	6.00	1.40	6.40
4500-5000 yuan	4743.20	3018.70	229.70	126.60	6.60	15.60	17.50	2.00	4.80	6.60	1.30	7.00
≥ 5000 yuan	7762.60	4529.70	231.70	124.30	7.30	17.70	18.80	4.50	5.70	7.50	1.40	11.00

Source: China Yearbook of Rural Household Survey 2005 and author's estimates.

Table B.32 Income, expenditure and food consumption data by 20 income groups in rural China, 2005 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤ 100 yuan	-1122.50	2810.90	184.20	73.70	6.90	13.00	15.50	8.50	2.50	4.30	1.40	5.00
100-200 yuan	150.70	2271.30	157.50	84.70	5.50	10.40	12.40	2.40	2.40	2.70	0.80	3.70
200-300 yuan	255.40	1650.50	176.70	82.10	4.30	6.60	16.60	1.50	2.20	2.60	1.10	3.60
300-400 yuan	351.40	1469.70	189.30	71.20	5.40	7.50	12.70	2.80	1.80	2.90	1.00	2.20
400-500 yuan	451.10	1395.00	191.60	74.20	4.10	7.60	13.60	1.70	2.50	2.50	0.80	1.80
500-600 yuan	551.60	1282.60	184.30	69.80	4.60	5.50	10.80	1.60	1.30	2.10	0.70	1.30
600-800 yuan	705.20	1271.10	193.10	71.70	4.40	7.00	12.30	1.90	1.70	2.10	0.80	1.50
800-1000 yuan	903.30	1397.50	195.10	77.80	4.60	7.60	13.70	1.70	1.80	2.40	0.80	1.70
1000-1200 yuan	1102.50	1477.00	198.00	82.00	4.60	8.40	15.30	2.40	1.90	2.60	1.00	1.90
1200-1300 yuan	1250.30	1562.90	198.80	81.80	4.80	8.40	14.70	2.10	2.10	2.83	0.90	2.20
1300-1500 yuan	1401.80	1594.90	201.40	88.10	5.00	8.40	15.00	1.90	2.30	3.00	1.00	2.10
1500-1700 yuan	1599.60	1716.20	204.70	90.50	5.00	9.40	15.30	1.80	2.50	3.20	1.00	2.50
1700-2000 yuan	1850.30	1814.10	202.80	96.10	5.10	9.60	15.60	2.30	2.70	3.60	1.10	2.90
2000-2500 yuan	2244.30	2028.00	208.30	100.00	5.70	10.60	15.90	2.10	3.10	4.10	1.10	3.50
2500-3000 yuan	2742.20	2261.90	210.80	105.40	6.00	11.30	16.20	2.50	3.50	4.60	1.10	4.10
3000-3500 yuan	3238.20	2527.50	214.90	109.40	6.50	12.60	21.20	2.50	3.80	5.10	1.10	4.80
3500-40000 yuan	3738.10	2753.50	216.30	112.50	6.40	13.60	17.60	3.00	4.20	5.40	1.20	5.70
40000-4500 yuan	4241.20	3013.00	216.20	113.80	6.90	14.00	17.80	3.00	4.20	5.50	1.20	6.20
4500-5000 yuan	4737.30	3217.90	216.40	117.60	6.80	15.00	18.10	2.90	4.70	6.10	1.20	6.80
≥5000 yuan	7912.30	4669.00	215.90	117.90	7.60	18.00	20.20	5.30	6.30	7.60	1.40	10.80

Source: China Yearbook of Rural Household Survey 2006.

Table B.33 Income, expenditure and food consumption data by 20 income groups in rural China, 2006 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-1647.60	3219.00	194.40	84.90	7.10	15.60	14.80	3.90	3.10	6.10	1.20	5.70
100-200 yuan	140.80	1950.00	154.00	72.50	5.50	10.30	12.00	2.00	1.90	3.70	1.00	2.40
200-300 yuan	252.50	1764.90	182.10	80.20	5.20	9.50	14.00	3.10	1.90	3.60	0.60	2.20
300-400 yuan	352.50	1664.70	197.80	68.50	5.10	7.10	12.90	2.90	1.70	2.50	0.90	1.90
400-500 yuan	454.80	1600.10	171.20	73.10	4.10	6.60	13.70	1.80	1.70	2.60	0.70	1.90
500-600 yuan	555.40	1307.40	172.40	71.40	4.40	7.10	13.60	2.40	1.40	2.70	0.80	1.50
600-800 yuan	702.60	1299.90	177.40	70.20	4.20	6.20	12.80	2.00	1.50	2.20	0.80	1.50
800-1000 yuan	905.60	1432.20	187.10	79.70	4.30	7.80	14.10	1.30	1.80	2.40	0.80	1.60
1000-1200 yuan	1103.30	1525.00	189.90	77.80	4.80	7.30	15.10	2.10	1.90	2.80	0.90	1.80
1200-1300 yuan	1250.20	1596.40	192.20	80.70	4.80	8.00	14.10	2.00	2.00	2.70	0.80	1.80
1300-1500 yuan	1402.20	1636.20	197.60	85.40	4.70	8.10	14.80	2.30	2.10	3.00	0.90	2.10
1500-1700 yuan	1602.30	1727.80	196.10	88.10	4.90	8.30	16.00	2.20	2.20	3.30	1.00	2.30
1700-2000 yuan	1853.70	1851.70	200.10	91.30	4.90	8.90	16.00	2.00	2.40	3.40	1.00	2.60
2000-2500 yuan	2248.30	2049.00	203.10	96.60	5.30	9.90	15.70	2.20	2.70	4.10	1.00	3.10
2500-3000 yuan	2745.80	2336.40	205.70	100.60	5.70	11.00	16.00	2.70	3.10	4.70	1.10	3.70
3000-3500 yuan	3244.70	2624.40	210.10	105.40	5.90	11.60	16.70	2.70	3.40	5.10	1.10	4.40
3500-40000 yuan	3738.10	2861.20	211.40	107.00	6.10	12.60	17.30	2.90	3.90	5.60	1.10	5.00
40000-4500 yuan	4240.10	3139.50	213.00	110.30	6.50	13.30	18.10	3.70	4.00	5.80	1.20	6.00
4500-5000 yuan	4737.70	3413.60	217.40	115.10	6.60	14.30	18.20	3.40	4.30	6.00	1.20	6.20
≥5000 yuan	7938.80	5000.70	214.80	114.40	7.20	17.60	20.60	5.50	5.70	7.60	1.30	10.50

Source: China Yearbook of Rural Household Survey 2007.

Table B.34 Income, expenditure and food consumption data by 20 income groups in rural China, 2007 (Unit: yuan, kg/capita/year)

Income group	Per capita net income	Per capita consumption expenditure	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
≤100 yuan	-2440.10	3803.20	176.20	85.50	7.40	14.30	14.80	6.80	4.30	5.40	1.10	6.30
100-200 yuan	153.60	2589.20	150.50	79.20	5.30	13.40	12.40	4.60	2.50	3.50	0.60	3.30
200-300 yuan	254.30	2748.90	181.80	77.40	5.80	7.90	13.90	4.10	2.80	3.00	0.90	3.00
300-400 yuan	351.50	1853.40	173.80	71.30	4.90	14.10	12.50	5.20	2.30	2.80	1.00	2.60
400-500 yuan	453.40	1582.40	174.20	64.70	4.60	7.30	9.90	3.80	2.10	2.60	0.80	2.20
500-600 yuan	554.10	1540.40	168.00	67.00	4.20	7.60	9.80	1.50	1.80	1.90	0.80	1.60
600-800 yuan	708.60	1440.40	172.50	72.50	4.20	7.50	10.40	2.20	1.70	2.20	0.70	1.60
800-1000 yuan	908.50	1526.30	176.80	71.40	4.00	6.80	12.10	1.80	1.90	2.20	0.90	1.90
1000-1200 yuan	1104.90	1617.60	181.90	71.30	4.40	7.60	12.10	2.00	1.70	2.40	0.80	1.80
1200-1300 yuan	1252.10	1659.80	186.40	72.00	4.40	8.40	12.50	2.20	2.10	2.40	0.90	2.00
1300-1500 yuan	1403.60	1776.90	188.20	76.10	4.70	9.20	12.90	2.80	2.20	2.50	0.90	2.10
1500-1700 yuan	1601.10	1875.30	188.70	80.10	4.70	9.80	13.50	2.10	2.30	2.70	0.90	2.20
1700-2000 yuan	1848.70	1993.80	191.80	84.40	4.80	9.30	13.30	2.40	2.50	3.10	1.00	2.60
2000-2500 yuan	2252.80	2184.20	192.20	90.40	5.10	10.30	13.80	2.60	2.70	3.50	1.00	3.10
2500-3000 yuan	2745.10	2452.10	198.30	94.80	5.50	10.90	13.90	2.50	3.10	4.00	1.00	3.80
3000-3500 yuan	3245.60	2673.40	201.90	97.60	5.90	12.20	14.20	2.80	3.60	4.50	1.00	4.30
3500-40000 yuan	3744.50	2981.30	204.10	103.50	6.10	12.60	14.40	3.20	3.70	4.80	1.10	4.90
40000-4500 yuan	4239.30	3262.30	209.40	107.70	6.40	13.70	15.00	3.40	4.20	5.10	1.10	5.40
4500-5000 yuan	4740.70	3501.80	204.90	109.70	6.50	14.20	15.50	3.60	4.40	5.50	1.20	5.80
≥ 5000 yuan	8201.70	5210.80	207.90	115.20	7.20	18.30	17.60	5.50	5.80	6.90	1.30	9.70

Source: China Yearbook of Rural Household Survey 2008.

Table B.35 Estimations of expenditure elasticities with food consumption data by 20 (9[a], 12[b]) income groups in rural China, 1980-2007 (to be continued)

Year	Item	Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
	Expenditure elasticity	0.381	0.612	1.051	N.A.	1.110	N.A.	1.285	1.222	1.261	N.A.
1980	t-statistic	9.275	11.084	15.316	N.A.	21.043	N.A.	20.317	10.988	25.992	N.A.
	Adjusted R^2	0.934	0.953	0.975	N.A.	0.987	N.A.	0.986	0.952	0.991	N.A.
	Expenditure elasticity	0.127	0.329	0.524	NA	0.662	NA	1.202	1.028	0.972	NA
1985	t-statistic	3.184	5.317	7.984	NA	10.073	NA	27.231	13.613	13.307	NA
	Adjusted R^2	0.504	0.752	0.875	NA	0.918	NA	0.988	0.953	0.951	NA
	Expenditure elasticity	0.220	0.498	0.642	NA	0.356 [c]	NA	1.399	0.970	0.972	NA
1990	t-statistic	5.448	8.635	16.190	NA	2.488	NA	34.145	20.135	23.752	NA
	Adjusted R^2	0.761	0.891	0.967	NA	0.366	NA	0.992	0.978	0.984	NA
	Expenditure elasticity	0.186	0.380	0.465	NA	0.613	NA	1.499	1.062	0.601	NA
1995	t-statistic	7.852	3.653	14.701	NA	12.202	NA	26.302	17.084	23.447	NA
	Adjusted R^2	0.781	0.421	0.927	NA	0.897	NA	0.976	0.945	0.970	NA
	Expenditure elasticity	0.157	0.567	0.537	NA	0.556	NA	1.585	1.289	0.810	NA
1998	t-statistic	5.127	7.670	23.751	NA	12.023	NA	22.451	8.966	12.475	NA
	Adjusted R^2	0.598	0.773	0.971	NA	0.894	NA	0.967	0.824	0.901	NA
	Expenditure elasticity	0.188	0.631	0.476	NA	0.582	NA	1.726	1.120	0.788	NA
1999	t-statistic	8.688	9.038	15.124	NA	9.782	NA	16.471	17.101	12.180	NA
	Adjusted R^2	0.814	0.826	0.931	NA	0.848	NA	0.941	0.945	0.897	NA

Table B.35 Estimations of expenditure elasticities with food consumption data by 20 income groups in rural China, 1980-2007 (continued-1)

Year		Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
	Expenditure elasticity	0.195	0.669	0.241	NA	0.605	NA	1.538	1.062	0.680	NA
2000	t-statistic	9.046	7.935	3.161	NA	12.733	NA	13.233	16.610	8.815	NA
	Adjusted R^2	0.826	0.785	0.346	NA	0.905	NA	0.911	0.942	0.819	NA
	Expenditure elasticity	0.192	0.601	0.460	NA	0.580	NA	1.495	0.997	0.679	NA
2001	t-statistic	8.839	8.320	16.417	NA	9.601	NA	15.881	13.097	7.227	NA
	Adjusted R^2	0.819	0.801	0.940	NA	0.843	NA	0.937	0.909	0.751	NA
	Expenditure elasticity	0.195	0.560	0.483	0.863	0.503	0.289	1.307	1.049	0.538	1.657
2002	t-statistic	7.737	8.483	9.243	11.082	8.787	1.891	17.318	14.485	4.526	27.566
	Adjusted R^2	0.776	0.807	0.832	0.878	0.818	0.132	0.946	0.925	0.534	0.978
	Expenditure elasticity	0.183	0.585	0.615	0.857	0.499	0.137	1.180	0.924	0.550	1.583
2003	t-statistic	9.668	7.654	20.282	19.676	7.114	0.870	23.080	21.128	10.994	39.792
	Adjusted R^2	0.845	0.772	0.960	0.958	0.745	-0.015	0.969	0.963	0.876	0.989
	Expenditure elasticity	0.217	0.597	0.681	0.678	0.501	0.197	1.185	1.094	0.613	1.514
2004	t-statistic	8.039	6.796	13.803	12.346	6.496	1.370	17.742	12.932	8.639	22.128
	Adjusted R^2	0.789	0.727	0.918	0.899	0.708	0.049	0.949	0.907	0.812	0.966
	Expenditure elasticity	0.126	0.546	0.508	0.894	0.409	0.558	1.127	1.084	0.413	1.650
2005	t-statistic	2.074	10.319	9.643	11.847	4.363	4.448	10.207	10.185	4.301	16.243
	Adjusted R^2	0.163	0.861	0.844	0.891	0.515	0.525	0.859	0.858	0.507	0.939

Table B.35 Estimations of expenditure elasticities with food consumption data by 20 income groups in rural China, 1980-2007 (continued-2)

Year		Grain	Vegetables	Edible oil	Fruits	Meat	Milk	Poultry	Eggs	Sugar	Aquatic products
2006	Expenditure elasticity	0.207	0.519	0.468	0.818	0.326	0.609	1.152	1.077	0.495	1.593
	t-statistic	3.581	7.998	11.833	12.936	5.110	3.919	14.622	14.890	4.767	32.839
	Adjusted R^2	0.410	0.787	0.891	0.907	0.596	0.458	0.926	0.928	0.561	0.984
2007	Expenditure elasticity	0.158	0.517	0.522	0.691	0.384	0.647	0.997	1.049	0.321	1.394
	t-statistic	2.560	7.570	19.857	4.879	5.869	2.620	12.717	11.125	2.579	14.469
	Adjusted R^2	0.246	0.768	0.959	0.573	0.663	0.257	0.904	0.878	0.250	0.925

Note: [a] 1980

[b] 1990

[c] The expenditure elasticity of demand for meat in 1990 is significantly lower than the values for the former and the latter years. This is possibly due to statistical errors in the original meat consumption data of 1990, which show great variations from the neighboring years.

Source: Author's estimates according to China Yearbook of Rural Household Survey 2000-2008.

Appendix C LA/AIDS Analysis data

C.1 LA/AIDS Analysis of urban China

Table C.1 Expenditure on food items by 7 income groups in urban China, 1995-2008 (to be continued)

Unit: yuan

Year	Income group	Food total	Grain	Meat & Poultry	Meat	Poultry	Eggs	Aquatic products	Milk	Edible oil	Vegetables
1995	**Lowest (10%)**	1226.06	236.57	286.72	N.A.	N.A	52.48	76.66	16.38	64.76	146.61
	Low (10%)	1462.42	254.38	349.33	N.A.	N.A	62.48	97.31	21.40	70.61	166.43
	Lower Middle (20%)	1606.15	254.32	382.18	N.A.	N.A	66.05	108.43	26.89	71.36	177.48
	Middle (20%)	1770.12	259.12	422.67	N.A.	N.A	70.57	121.09	32.49	72.63	190.61
	Upper Middle (20%)	1946.42	266.40	462.95	N.A.	N.A	74.81	135.08	36.44	75.03	203.88
	High (10%)	2127.00	274.21	496.70	N.A.	N.A	78.61	147.07	41.68	78.32	220.41
	Highest (10%)	2440.91	291.71	550.08	N.A.	N.A	86.78	172.67	49.64	81.64	240.34
1996	**Lowest (10%)**	1356.24	254.80	312.96	N.A.	N.A	60.18	86.68	18.27	64.05	162.64
	Low (10%)	1570.80	261.56	366.70	N.A.	N.A	69.06	105.77	26.57	65.58	179.31
	Lower Middle (20%)	1724.35	265.19	400.28	N.A.	N.A	75.14	116.72	30.65	68.30	192.38
	Middle (20%)	1902.79	270.40	446.37	N.A.	N.A	79.57	134.04	36.77	70.67	208.71
	Upper Middle (20%)	2113.15	280.14	487.87	N.A.	N.A	85.02	149.89	42.35	70.39	224.38
	High (10%)	2284.93	280.88	522.84	N.A.	N.A	90.21	159.12	50.19	71.28	235.56
	Highest (10%)	2583.17	296.20	567.71	N.A.	N.A	95.71	181.98	57.98	73.27	257.63

Source: China Statistical Yearbook 1996-2009, China Urban Life and Price Yearbook 1996-2009.

Table C.1 Expenditure on food items by 7 income groups in urban China, 1995-2008 (continued-1)

Year	Income group	Food total	Grain	Meat & Poultry	Meat	Poultry	Eggs	Aquatic products	Milk	Edible oil	Vegetables
	Lowest (10%)	1332.22	222.78	317.42	N.A.	N.A	57.99	89.02	20.54	66.17	157.28
	Low (10%)	1571.52	232.24	376.20	N.A.	N.A	65.43	106.74	28.94	70.13	175.91
	Lower Middle (20%)	1751.21	234.09	421.72	N.A.	N.A	70.17	124.19	34.89	70.30	190.89
1997	**Middle (20%)**	1949.74	238.57	467.34	N.A.	N.A	74.80	142.80	41.50	71.07	204.26
	Upper Middle (20%)	2151.35	242.09	511.16	N.A.	N.A	78.96	159.13	49.48	71.61	219.96
	High (10%)	2383.99	241.41	556.07	N.A.	N.A	82.75	183.12	54.10	72.35	237.40
	Highest (10%)	2725.71	263.28	610.90	N.A.	N.A	88.43	200.90	68.29	74.05	261.08
	Lowest (10%)	1302.84	211.54	297.18	N.A.	N.A	52.96	90.36	22.58	68.88	150.67
	Low (10%)	1554.21	218.26	355.40	N.A.	N.A	59.25	108.93	30.39	75.13	171.75
	Lower Middle (20%)	1735.59	222.85	397.13	N.A.	N.A	64.35	126.74	40.34	75.38	183.94
1998	**Middle (20%)**	1931.48	226.95	438.75	N.A.	N.A	67.72	145.11	47.73	76.54	199.62
	Upper Middle (20%)	2139.61	230.90	479.30	N.A.	N.A	71.27	160.04	57.16	75.13	212.21
	High (10%)	2397.99	237.90	527.67	N.A.	N.A	76.07	181.69	70.51	77.86	230.87
	Highest (10%)	2667.16	245.57	555.64	N.A.	N.A	81.71	199.42	77.57	78.04	245.25
	Lowest (10%)	1313.28	199.77	288.49	N.A.	N.A	53.01	90.43	25.60	68.84	151.82
	Low (10%)	1548.10	209.31	340.92	N.A.	N.A	58.67	111.94	36.87	72.68	168.62
	Lower Middle (20%)	1735.47	215.16	378.71	N.A.	N.A	62.59	128.02	46.60	76.35	182.99
1999	**Middle (20%)**	1917.46	212.38	415.24	N.A.	N.A	65.97	145.56	55.74	73.58	194.91
	Upper Middle (20%)	2144.90	216.07	450.76	N.A.	N.A	69.92	163.34	68.51	72.37	210.28
	High (10%)	2395.88	224.59	492.65	N.A.	N.A	72.70	178.83	77.52	75.52	224.22
	Highest (10%)	2762.52	240.08	525.50	N.A.	N.A	79.88	205.92	93.11	76.79	245.94

Table C.1 Expenditure on food items by 7 income groups in urban China, 1995-2008 (continued-2)

Year	Income group	Food total	Grain	Meat & Poultry	Meat	Poultry	Eggs	Aquatic products	Milk	Edible oil	Vegetables
	Lowest (10%)	1256.62	171.34	283.41	N.A.	N.A	44.60	88.35	32.37	60.14	146.30
	Low (10%)	1524.48	178.29	340.08	N.A.	N.A	50.68	107.32	43.24	65.17	166.67
	Lower Middle (20%)	1748.90	186.53	388.58	N.A.	N.A	54.39	128.08	56.69	67.57	182.38
2000	**Middle (20%)**	1960.82	188.18	422.22	N.A.	N.A	57.53	144.42	69.34	66.94	193.16
	Upper Middle (20%)	2215.56	192.24	453.29	N.A.	N.A	61.02	167.68	82.13	67.64	207.32
	High (10%)	2458.60	201.71	485.99	N.A.	N.A	63.11	178.59	95.54	67.37	222.63
	Highest (10%)	2847.03	210.87	534.10	N.A.	N.A	67.36	205.34	117.29	69.84	245.11
	Lowest (10%)	1301.05	172.70	291.42	N.A.	N.A	45.46	97.32	38.80	54.36	151.42
	Low (10%)	1569.77	182.31	348.85	N.A.	N.A	51.61	115.83	50.96	57.81	171.82
	Lower Middle (20%)	1790.57	185.82	385.25	N.A.	N.A	54.55	134.23	66.07	58.85	183.36
2001	**Middle (20%)**	2032.81	192.50	428.98	N.A.	N.A	58.80	157.95	80.66	61.78	196.56
	Upper Middle (20%)	2272.11	188.35	458.58	N.A.	N.A	59.82	171.69	97.81	59.49	208.43
	High (10%)	2509.80	194.31	480.84	N.A.	N.A	62.11	189.63	111.60	58.22	222.67
	Highest (10%)	2921.26	205.96	522.62	N.A.	N.A	67.42	213.94	131.15	59.09	241.91
	Lowest (10%)	1127.41	166.46	260.75	205.71	55.04	43.36	54.44	31.50	56.92	141.28
	Low (10%)	1457.87	174.11	340.29	261.83	78.46	52.16	78.13	51.94	63.30	167.03
	Lower Middle (20%)	1772.88	178.38	398.03	301.78	96.25	56.94	106.74	75.42	64.24	186.34
2002	**Middle (20%)**	2140.34	186.66	458.68	340.96	117.72	59.80	149.14	99.15	66.08	209.48
	Upper Middle (20%)	2596.95	199.13	514.38	376.53	137.85	63.41	203.41	128.31	66.03	237.06
	High (10%)	3171.36	211.77	582.02	413.87	168.15	68.68	278.42	163.67	66.86	265.92
	Highest (10%)	4100.79	227.52	651.00	447.29	203.71	68.42	384.98	205.34	65.08	304.85

Table C.1 Expenditure on food items by 7 income groups in urban China, 1995-2008 (continued-3)

Year	Income group	Food total	Grain	Meat & Poultry	Meat	Poultry	Eggs	Aquatic products	Milk	Edible oil	Vegetables
2003	**Lowest (10%)**	1222.76	170.66	283.09	224.60	58.50	45.44	60.57	38.31	70.35	161.86
	Low (10%)	1594.67	178.47	364.71	281.66	83.06	53.72	85.57	66.24	76.94	188.02
	Lower Middle (20%)	1926.06	188.56	419.32	319.99	99.32	60.31	114.88	95.63	79.64	211.78
	Middle (20%)	2293.98	190.53	477.16	356.82	120.34	60.88	154.27	122.90	78.92	233.16
	Upper Middle (20%)	2762.75	202.68	538.63	398.08	140.55	65.72	201.02	153.33	81.56	262.59
	High (10%)	3337.82	213.74	597.80	433.75	164.05	70.05	268.90	189.32	80.17	292.69
	Highest (10%)	4332.62	220.08	651.98	457.29	194.70	68.84	377.10	228.01	77.45	322.62
2004	**Lowest (10%)**	1417.76	219.10	325.49	261.19	64.30	50.92	67.25	46.32	80.69	181.51
	Low (10%)	1827.42	229.99	408.15	321.54	86.81	60.61	93.37	78.05	86.37	209.60
	Lower Middle (20%)	2201.88	232.81	477.70	370.52	107.18	67.63	124.74	106.77	89.96	232.63
	Middle (20%)	2581.24	234.29	534.02	410.65	123.37	69.18	160.97	131.64	90.08	255.71
	Upper Middle (20%)	3130.75	248.35	605.95	459.54	146.41	74.29	216.70	162.90	93.07	287.40
	High (10%)	3740.68	255.10	658.06	494.30	163.76	77.74	282.60	194.65	92.91	311.62
	Highest (10%)	4914.64	260.68	713.85	519.64	194.21	74.75	393.58	237.34	87.57	341.53
2005	**Lowest (10%)**	1475.67	219.24	343.43	270.46	72.97	51.69	70.33	50.75	73.36	191.00
	Low (10%)	1926.01	226.76	433.51	336.03	97.48	63.79	101.05	82.73	79.14	222.91
	Lower Middle (20%)	2336.30	232.78	514.28	394.34	119.94	68.85	133.18	110.80	83.59	250.00
	Middle (20%)	2838.83	241.91	584.52	442.06	142.46	74.15	176.00	140.44	89.13	279.95
	Upper Middle (20%)	3425.91	254.36	655.83	493.50	162.33	78.21	234.15	173.23	90.98	312.32
	High (10%)	4151.09	264.80	716.12	526.11	190.01	84.39	314.58	206.79	90.35	342.67
	Highest (10%)	5367.27	267.05	756.41	547.11	209.30	79.86	403.67	248.28	88.23	360.61

Table C.1 Expenditure on food items by 7 income groups in urban China, 1995-2008 (continued-4)

Year	Income group	Food total	Grain	Meat & Poultry	Meat	Poultry	Eggs	Aquatic products	Milk	Edible oil	Vegetables
	Lowest (10%)	1586.02	219.11	346.32	272.83	73.49	49.46	79.01	60.87	72.61	212.36
	Low (10%)	2073.45	229.81	439.20	341.11	98.09	57.94	111.16	95.12	80.67	245.69
	Lower Middle (20%)	2484.28	239.38	496.82	383.47	113.35	65.58	143.78	121.64	87.04	272.36
2006	**Middle (20%)**	3019.37	246.43	556.63	425.85	130.78	70.60	188.37	153.18	91.01	303.62
	Upper Middle (20%)	3647.94	257.74	623.58	471.80	151.78	74.19	257.57	183.65	90.59	335.95
	High (10%)	4392.35	270.04	685.74	513.42	172.32	78.66	327.12	217.92	93.48	362.54
	Highest (10%)	5746.72	272.63	725.79	535.31	190.48	76.05	417.64	260.34	90.71	385.66
	Lowest (10%)	1904.09	223.65	437.69	336.50	101.19	58.53	97.68	75.97	92.13	236.63
	Low (10%)	2451.15	246.86	552.68	419.48	133.20	70.24	137.56	108.93	106.04	279.77
	Lower Middle (20%)	2942.78	263.13	637.47	479.56	157.91	78.65	179.95	130.73	113.84	319.40
2007	**Middle (20%)**	3538.30	280.51	717.29	537.76	179.53	88.16	229.62	165.24	122.05	356.35
	Upper Middle (20%)	4229.78	302.84	806.75	596.19	210.56	94.75	302.69	192.23	128.24	395.75
	High (10%)	5062.13	319.37	883.03	644.18	238.85	97.76	376.47	225.78	127.05	422.26
	Highest (10%)	6439.53	325.94	958.33	685.51	272.82	98.86	491.01	263.96	128.58	457.25
	Lowest (10%)	2182.29	259.95	534.63	417.52	117.11	64.63	115.24	86.68	129.20	273.12
	Low (10%)	2846.26	286.61	699.03	539.20	159.83	78.00	164.78	120.75	149.64	332.90
	Lower Middle (20%)	3428.85	305.37	806.49	620.31	186.18	85.96	211.68	155.21	159.92	371.72
2008	**Middle (20%)**	4181.25	335.58	930.11	710.16	219.95	95.93	270.97	191.18	171.12	417.61
	Upper Middle (20%)	5043.63	355.87	1039.71	784.46	255.25	102.51	349.18	234.00	177.09	466.89
	High (10%)	6087.25	384.74	1160.64	866.96	293.68	108.37	444.47	278.16	184.44	516.82
	Highest (10%)	7874.14	403.34	1237.89	910.50	327.39	111.23	551.39	327.43	183.11	542.91

Table C.2 Prices of major meat and poultry products in urban China

Unit: yuan/kg

	Pork	Beef	Mutton	Poultry
2005	9.98	16.82	16.28	8.22
2006	12.74	17.22	18.42	9.85
2007	20.23	24.55	25.96	11.96
Average	14.32	19.53	20.22	10.01

Note: 1) The prices here are measured on the carcass basis at the wholesale market.

2) Prices reported are for December in every year.

Source: China Yearbook of Agricultural Price Survey 2006-2008.

C.2 LA/AIDS Analysis of rural China: by income groups

Table C.3 Price indexes for food items, 1996-2008 (the preceding year = 100)

Year	CPI-grain	CPI-meat& poultry	CPI-eggs	CPI-edible oil	CPI-poultry	CPI-vegetables	CPI-aquatic	CPI-sugar	CPI-milk
1996	105.40	105.20	115.80	92.50	105.20	120.70	105.00	101.60	107.40
1997	89.80	105.50	80.30	102.00	105.50	99.70	100.60	99.70	102.30
1998	96.90	90.00	100.20	98.00	90.00	101.10	93.30	95.20	98.80
1999	97.10	91.20	92.40	93.80	91.20	102.50	92.40	84.60	98.20
2000	88.40	99.40	84.90	87.90	99.40	105.30	100.80	109.50	99.30
2001	99.70	101.40	105.30	92.90	101.40	100.00	97.80	105.40	99.70
2002	98.40	99.40	102.90	98.20	101.80	99.00	95.60	95.00	97.30
2003	102.20	106.30	99.00	113.40	101.50	113.40	99.90	95.50	99.00
2004	127.70	121.40	119.60	121.80	113.60	97.40	114.70	103.00	101.80
2005	101.30	100.60	105.40	94.40	108.40	106.80	105.50	105.60	101.90
2006	102.90	96.10	96.00	98.30	96.40	108.40	100.60	113.40	100.80
2007	106.20	139.50	121.10	128.30	123.80	109.50	106.50	100.70	102.10
2008	106.70	123.60	104.30	125.90	108.60	111.30	115.00	102.50	113.30

Source: China Statistical Yearbook 1997-2009, China Urban Life and Price Yearbook 1997-2009.

Table C.4 Prices of agricultural products at rural market fairs (RMFs)

Year	Chinese cabbage	Cucumber	Tomato	Green bell	Kidney beans	Pork	Beef	Mutton	Wheat	Maize	Long-grain rice	Round-grain rice	Peanut oil	Soybean oil
2000	N.A.	N.A.	N.A.	N.A.	N.A.	9.68	12.53	14.55	1.02	0.88	1.01	1.27	8.49	6.37
2001	N.A.	N.A.	N.A.	N.A.	N.A.	10.18	12.86	14.58	1.09	1.08	1.05	1.31	8.04	5.50
2002	0.75	1.81	1.88	2.21	2.48	9.85	13.66	15.16	1.06	1.03	1.04	1.15	7.88	5.50
2003	1.01	2.07	2.21	2.62	2.69	10.70	14.99	16.16	1.14	1.14	1.08	1.20	9.43	6.74
2004	1.00	2.03	2.18	2.60	2.80	13.97	16.21	16.98	1.52	1.40	1.51	1.72	11.15	7.71
2005	1.19	2.31	2.39	2.88	3.10	13.39	17.35	18.17	1.51	1.30	1.50	1.78	10.80	6.93
2006	1.31	2.53	2.73	3.12	3.38	12.30	18.16	19.15	1.47	1.36	1.51	1.47	10.81	6.79
2007	1.38	2.48	2.82	3.60	3.60	18.93	22.08	24.26	1.60	1.57	1.69	1.60	13.56	8.81
2008	1.41	2.52	2.95	3.68	3.80	23.53	30.99	32.36	1.77	1.72	1.90	1.77	18.36	11.86

Source: China Yearbook of Agricultural Price Survey 2004-2009.

C.3 LA/AIDS Analysis of rural China: by regions

C.3.1 Creation of dummy variables through PCA analysis of 26 regions

Table C.5 Per capita annual consumption of 12 food items in 26 regions, 2003 (to be continued)

Unit: kg/capita/year

Region	Wheat	Rice	Maize	Vegetables	Edible oil	Poultry
Anhui	76.30	143.30	1.80	80.97	6.87	4.27
Fujian	2.80	181.90	0.60	99.92	5.19	5.14
Gansu	208.10	6.00	9.80	40.02	4.95	1.11
Guangdong	0.90	224.90	1.20	130.22	6.73	10.40
Guangxi	0.40	188.60	11.40	108.94	4.92	7.33
Guizhou	11.00	150.90	29.50	130.67	3.85	1.18
Hainan	0.70	228.30	1.00	86.61	5.70	9.77
Hebei	153.50	17.60	28.30	55.97	6.59	0.54
Heilongjiang	48.80	94.10	37.90	111.70	7.62	2.61
Henan	195.50	18.40	17.00	100.11	4.22	1.23
Hubei	22.60	186.60	9.80	159.76	9.40	2.74
Hunan	1.50	240.70	0.80	149.44	8.35	3.89
Inner Mongolia	89.50	35.00	24.30	70.77	2.79	1.41
Jiangsu	51.70	180.10	15.70	109.12	8.27	4.50
Jiangxi	3.00	254.30	0.60	144.22	8.77	3.31
Jilin	26.90	123.10	88.10	115.20	6.27	3.23
Liaoning	30.90	90.50	45.70	178.59	5.90	2.51
Ningxia	165.00	47.80	1.00	84.38	7.22	2.81
Qinghai	185.10	4.60	0.10	53.93	8.25	0.55
Shaanxi	139.80	21.70	14.90	50.69	5.83	0.32
Shandong	178.40	4.80	34.00	118.19	6.96	2.70
Shanxi	138.20	11.00	21.40	80.87	5.72	0.24
Sichuan	28.10	180.20	7.60	180.65	5.21	3.59
Xinjiang	188.50	19.80	26.90	75.12	9.37	1.51
Yunnan	12.00	145.60	28.30	90.80	3.03	2.67
Zhejiang	3.50	194.40	1.00	83.91	5.81	6.03

Source: China Yearbook of Rural Household Survey, 2004.

Table C.5 Per capita annual consumption of 12 food items in 26 regions, 2003 (continued)

Unit: kg/capita/year

Region	Eggs	Aquatic	Pork	Beef	Mutton	Dairy
Anhui	5.04	5.43	8.70	0.30	0.10	0.25
Fujian	3.55	13.30	16.20	0.20	0.10	1.56
Gansu	2.14	0.24	9.80	0.20	0.80	0.75
Guangdong	2.83	13.30	22.00	0.30	0.10	0.21
Guangxi	1.12	3.57	14.20	0.20	0.00	0.05
Guizhou	1.20	0.33	27.40	0.40	0.30	0.03
Hainan	1.31	14.75	14.70	0.40	0.30	0.07
Hebei	6.36	2.25	6.60	0.30	0.20	0.67
Heilongjiang	6.26	3.35	7.50	0.20	0.10	0.73
Henan	8.01	1.35	5.80	0.50	0.20	0.35
Hubei	3.86	8.10	19.50	0.20	0.10	0.08
Hunan	3.28	6.89	17.20	0.20	0.10	0.16
Inner Mongolia	3.82	1.45	16.30	0.40	4.50	4.99
Jiangsu	6.72	9.09	11.30	0.40	0.30	1.66
Jiangxi	3.50	5.19	13.00	0.20	0.00	0.40
Jilin	8.64	3.60	11.00	0.40	0.10	0.42
Liaoning	9.59	4.49	15.70	0.30	0.40	0.97
Ningxia	2.74	0.51	7.80	0.90	2.60	2.22
Qinghai	0.77	0.53	12.50	6.80	11.20	19.71
Shaanxi	2.29	0.29	6.40	0.10	0.20	1.14
Shandong	11.61	4.01	7.60	0.20	0.30	2.41
Shanxi	6.15	0.47	4.80	0.10	0.40	1.79
Sichuan	4.73	1.91	27.50	0.40	0.20	0.83
Xinjiang	1.27	0.40	1.30	2.70	8.00	4.58
Yunnan	1.56	1.21	25.70	0.40	0.30	0.23
Zhejiang	5.33	14.64	15.50	0.50	0.40	3.15

Source: China Yearbook of Rural Household Survey, 2004.

Table C.6 PCA analysis results using regional per capita consumption of 12 food items

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	4.8542	2.2107	0.4045	4.8542	0.4045
2	2.6436	1.2102	0.2203	7.4978	0.6248
3	1.4334	0.1481	0.1194	8.9312	0.7443
4	1.2852	0.5285	0.1071	10.2164	0.8514
5	0.7568	0.2643	0.0631	10.9731	0.9144
6	0.4924	0.2608	0.0410	11.4656	0.9555
7	0.2317	0.1122	0.0193	11.6972	0.9748
8	0.1195	0.0258	0.0100	11.8167	0.9847
9	0.0936	0.0512	0.0078	11.9103	0.9925
10	0.0424	0.0057	0.0035	11.9527	0.9961
11	0.0367	0.0261	0.0031	11.9894	0.9991
12	0.0106	---	0.0009	12.0000	1.0000

Table C.7 Coefficients of PCs (Principal Components)

Variable	PC_1	PC_2	PC_3
Wheat	-0.4001	-0.1368	0.0564
Rice	0.3993	0.2413	0.0644
Maize	-0.0526	-0.4067	0.0616
Vegetables	0.2916	-0.0435	0.2036
Edible oil	-0.0525	0.1876	0.6978
Poultry	0.3246	0.2548	0.1225
Eggs	0.0219	-0.4265	0.4283
Aquatic products	0.3077	0.2340	0.2884
Pork	0.2733	0.1856	-0.4119
Beef	-0.3087	0.3860	0.0792
Mutton	-0.3450	0.3347	0.0215
Dairy	-0.3168	0.3515	0.0507

Table C.8 Principal Component (PC) scores

Region	PC1	PC2	PC3	Rice_Staple[a]	SCC[b]	LPMA[c]
Anhui	0.34	0.01	0.49	1	1	1
Fujian	1.94	1.08	-0.23	1	1	0
Gansu	-2.11	-0.94	-1.43	0	0	0
Guangdong	3.31	2.00	0.35	1	1	1
Guangxi	1.71	0.72	-1.02	1	1	0
Guizhou	1.09	-0.25	-2.54	1	0	0
Hainan	2.69	2.04	-0.02	1	1	0
Hebei	-1.71	-1.77	0.26	0	0	1
Heilongjiang	-0.02	-1.26	1.07	0	0	1
Henan	-1.50	-2.13	-0.16	0	0	0
Hubei	1.79	0.65	1.20	1	1	1
Hunan	2.09	1.01	0.75	1	1	1
Inner Mongolia	-1.58	-0.28	-2.09	0	0	0
Jiangsu	1.00	0.19	1.61	1	1	1
Jiangxi	1.74	0.82	1.06	1	1	1
Jilin	0.39	-2.51	0.92	1	0	1
Liaoning	0.94	-1.81	0.85	1	0	1
Ningxia	-1.75	0.24	0.06	0	1	1
Qinghai	-6.40	4.88	0.25	0	1	1
Shandong	-1.12	-2.33	1.73	0	0	1
Shanxi	-1.73	-1.81	-0.03	0	0	0
Shaanxi	-1.79	-1.05	-0.87	0	0	0
Sichuan	1.93	0.20	-1.02	1	1	0
Xinjiang	-3.98	1.15	1.22	0	1	1
Yunnan	0.94	-0.17	-2.81	1	0	0
Zhejiang	1.79	1.32	0.41	1	1	1

Note: a. Rice_Staple (summary of PC_1), means diet characteristic of taking rice as staple food.

b. SCC (summary of PC_2), means small consumption of coarse grains.

c. LPMA (summary of PC_3), means less pork-dependent or more aquatic consumption.

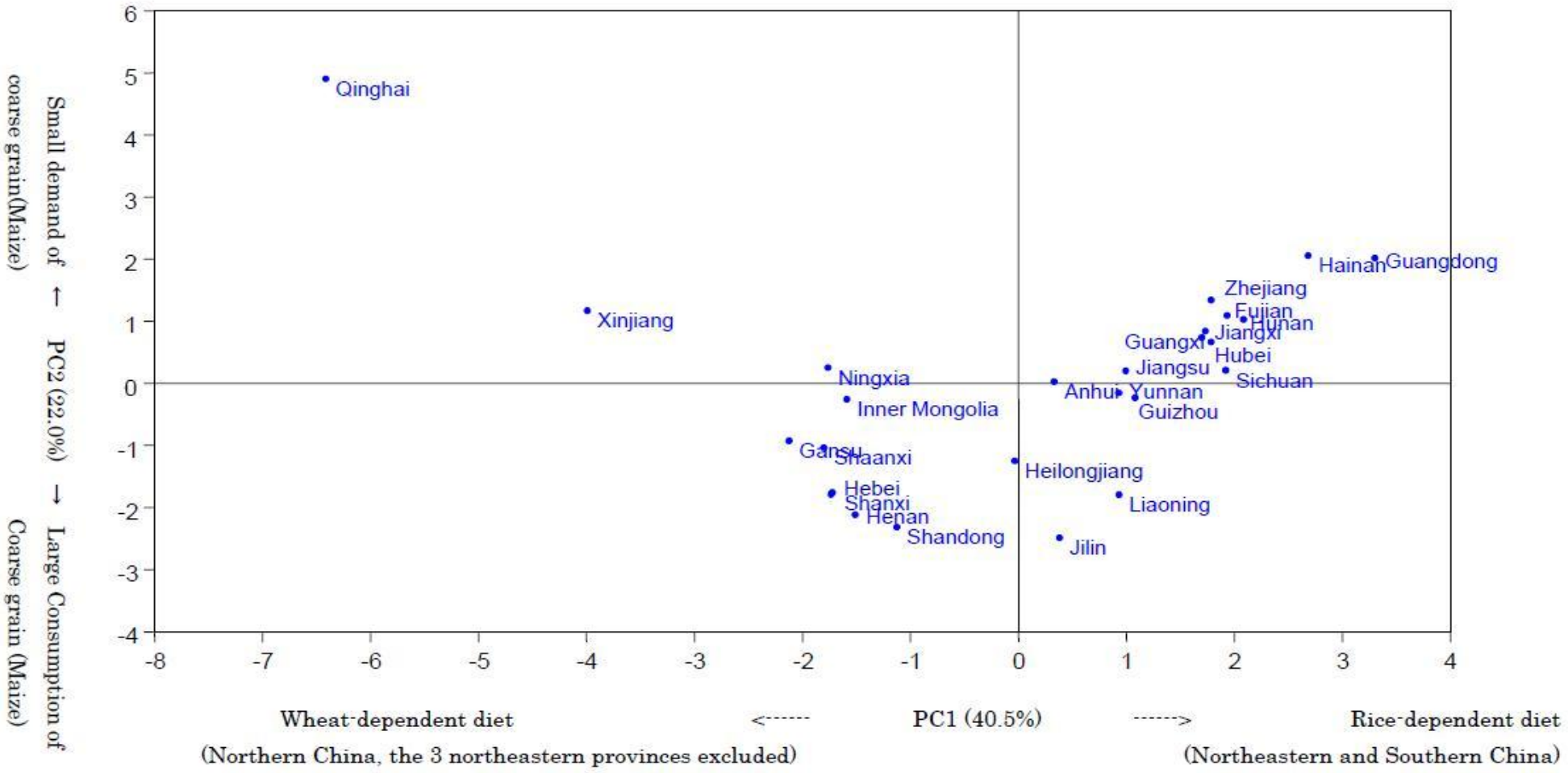

Figure C.1 Scatter of PC1 and PC2

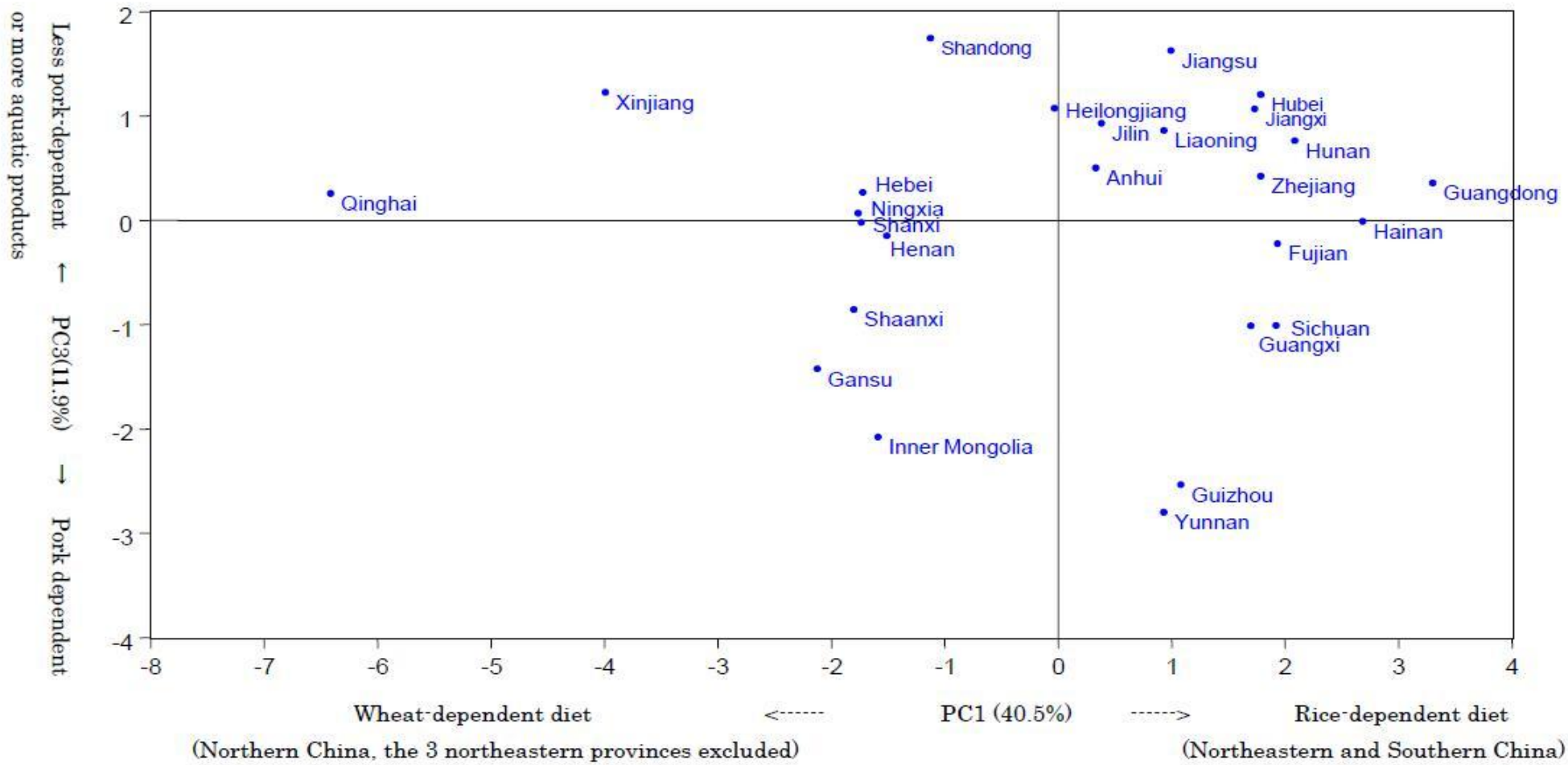

Figure C.2 Scatter of PC1 and PC3

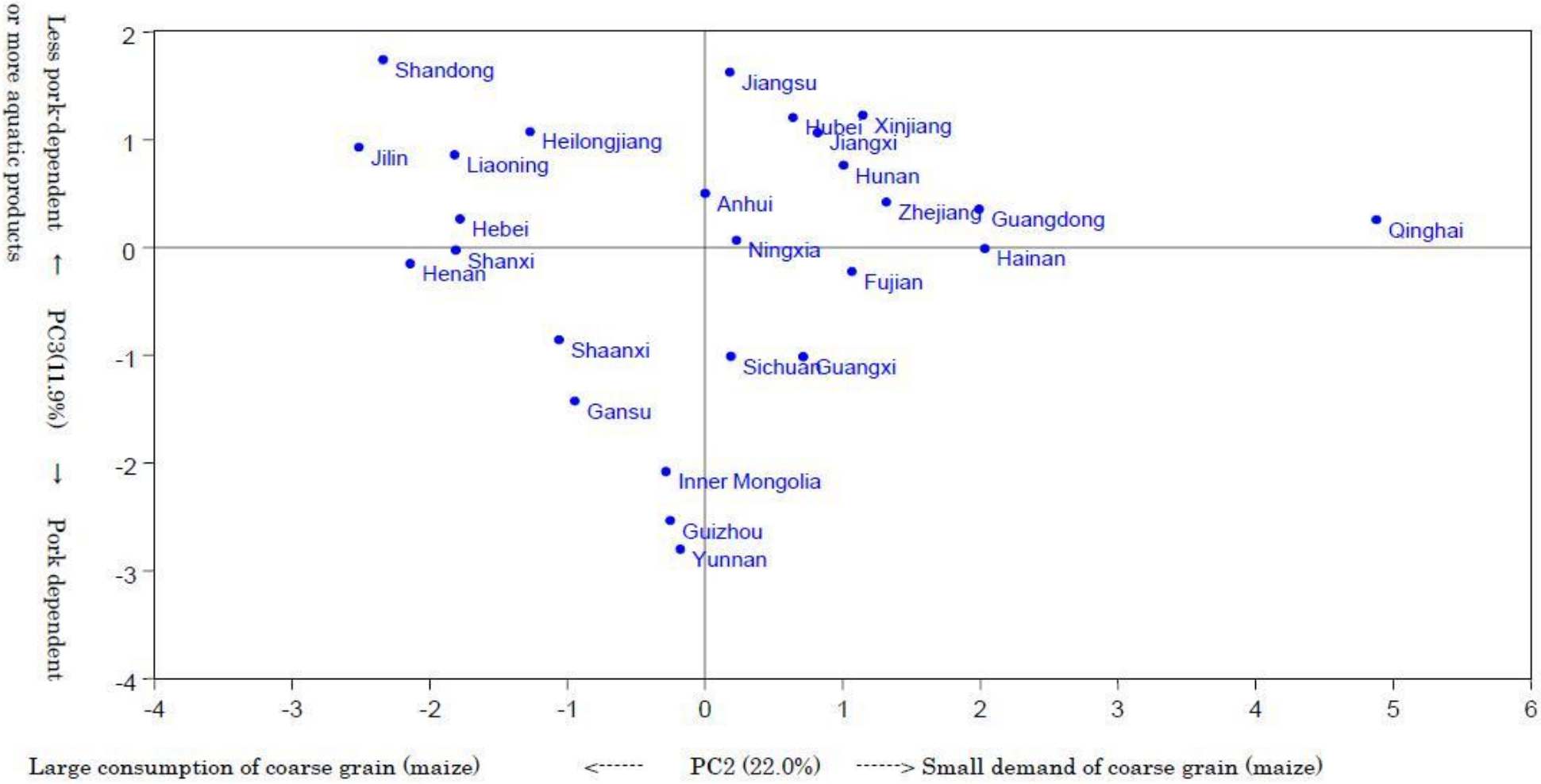

Figure C.3 Scatter of PC2 and PC3

C.3.2 Data on food consumption and price

C.3.2.1 Per capita food consumption data for rural households by regions (1995-2008)

Table C.9 Per capita food consumption data for rural households by regions, 1995 (Unit: kg/capita/year)

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	192.79	112.27	8.80	13.50	1.40	5.92	3.65
Tianjin	236.85	97.69	6.10	7.66	0.31	6.46	6.07
Hebei	209.44	89.04	4.67	5.26	0.22	3.69	1.56
Shanxi	227.04	81.77	3.79	4.47	0.10	2.83	0.31
Inner Mongolia	299.79	83.52	4.59	14.08	0.54	3.25	0.98
Liaoning	264.57	193.52	6.91	13.32	1.15	6.52	4.18
Jilin	324.25	159.83	7.57	11.11	1.97	6.90	3.80
Heilongjiang	315.09	29.18	8.75	6.14	1.83	5.29	3.67
Shanghai	250.69	72.77	6.35	13.90	4.24	5.64	9.91
Jiangsu	264.79	120.16	8.17	10.50	3.20	7.57	7.30
Zhejiang	264.48	84.89	3.96	13.58	3.60	3.79	11.43
Anhui	257.03	79.41	5.76	8.04	2.42	3.51	2.94
Fujian	288.22	105.62	4.57	14.89	4.97	3.05	9.36
Jiangxi	325.39	152.70	7.61	11.76	1.88	2.58	3.58
Shandong	237.58	102.41	5.51	6.00	0.83	6.24	3.08
Henan	234.89	52.76	3.31	4.20	0.35	2.71	0.49
Hubei	293.18	148.64	9.52	14.45	1.31	3.11	4.72
Hunan	306.56	140.14	7.51	14.77	2.07	2.56	4.17
Guangdong	254.40	112.36	7.17	17.64	7.38	2.98	12.04
Guangxi	246.23	117.69	4.49	11.07	3.68	0.88	2.09
Hainan	264.99	39.07	2.87	8.04	4.30	0.94	9.16
Sichuan	244.25	140.12	5.25	20.15	1.24	2.59	0.81
Guizhou	234.08	123.20	6.16	17.76	0.87	1.01	0.34
Yunnan	255.27	126.82	4.45	21.40	2.03	1.66	0.87
Tibet	264.56	23.31	4.59	12.13	0.01	1.05	0.01
Shaanxi	229.12	56.07	4.23	4.79	0.16	1.18	0.09
Gansu	244.88	32.04	3.68	5.63	0.68	1.08	0.09
Qinghai	241.06	34.99	8.49	12.01	0.17	0.54	0.14
Ningxia	286.88	68.59	6.42	8.03	0.75	1.08	0.46
Xinjiang	237.66	64.02	6.38	6.89	1.00	0.80	0.34

Source: China Statistical Yearbook 1996.

Table C.10 Per capita food consumption data for rural households by regions, 1996

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	167.75	107.15	8.59	13.23	1.13	5.57	4.17
Tianjin	236.97	94.27	7.41	9.84	0.35	6.72	6.65
Hebei	221.42	91.39	5.03	6.78	0.25	6.62	2.10
Shanxi	220.30	81.36	4.53	4.60	0.21	3.12	0.34
Inner Mongolia	276.26	82.76	4.95	18.43	0.46	2.32	1.02
Liaoning	259.41	205.82	6.99	14.30	1.37	5.97	4.39
Jilin	281.47	149.05	5.34	10.68	1.64	5.32	3.91
Heilongjiang	295.38	104.34	7.44	7.22	1.54	5.39	3.62
Shanghai	282.03	88.95	5.53	15.46	4.47	6.21	11.46
Jiangsu	273.58	117.30	8.84	13.75	3.69	9.66	10.36
Zhejiang	257.97	81.64	4.34	15.06	3.54	3.51	11.19
Anhui	254.86	81.07	6.51	8.70	2.38	3.64	3.84
Fujian	261.45	105.01	5.46	14.40	4.94	2.78	8.69
Jiangxi	317.55	154.22	7.20	12.78	2.03	2.92	4.15
Shandong	240.73	118.55	5.26	7.61	1.27	8.19	3.38
Henan	249.44	65.47	4.95	5.59	0.38	2.62	0.58
Hubei	289.26	155.09	10.08	15.27	1.46	3.47	5.44
Hunan	298.71	137.18	8.27	16.95	2.26	2.53	4.69
Guangdong	249.17	111.83	6.62	19.52	7.38	2.76	11.89
Guangxi	236.66	120.07	4.84	12.95	4.16	0.85	2.09
Hainan	224.83	49.36	2.61	9.28	4.64	0.75	8.65
Sichuan	247.44	137.67	5.39	22.99	1.50	2.55	1.03
Guizhou	236.08	126.29	5.89	20.87	0.91	0.92	0.26
Yunnan	260.26	127.82	4.54	22.33	2.10	1.59	0.90
Tibet	253.77	31.72	5.70	13.11	0.03	0.93	0.01
Shaanxi	234.90	55.01	4.53	5.36	0.15	1.00	0.12
Gansu	242.90	29.82	4.42	5.84	0.33	1.07	0.09
Qinghai	270.99	42.50	8.50	14.18	0.15	0.27	0.19
Ningxia	278.98	73.62	6.72	9.20	0.84	1.30	0.43
Xinjiang	233.88	71.14	7.37	10.30	1.12	1.00	0.50

Source: China Statistical Yearbook 1997.

Table C.11 Per capita food consumption data for rural households by regions, 1997

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	169.47	106.92	9.18	12.56	1.38	8.13	3.30
Tianjin	245.39	84.43	7.90	9.24	0.49	9.13	6.54
Hebei	223.35	85.02	5.75	6.40	0.39	5.25	1.85
Shanxi	220.44	80.85	4.64	4.75	0.28	3.50	0.34
Inner Mongolia	263.11	84.62	2.79	20.58	0.66	2.85	1.00
Liaoning	258.15	212.00	7.23	14.01	1.43	7.79	4.51
Jilin	239.17	135.13	5.87	9.44	2.10	6.30	3.50
Heilongjiang	288.91	101.28	7.36	7.40	2.03	5.99	3.12
Shanghai	260.80	84.62	5.65	14.75	6.03	7.93	11.70
Jiangsu	272.97	120.60	9.14	13.63	5.09	9.77	9.92
Zhejiang	261.28	74.49	4.18	13.49	4.20	4.64	11.25
Anhui	250.23	79.70	6.78	7.40	2.93	4.30	3.40
Fujian	267.34	118.71	4.92	13.26	5.50	3.43	9.18
Jiangxi	302.57	141.48	6.54	12.59	2.53	2.90	4.07
Shandong	240.33	120.28	5.87	6.63	1.99	9.92	3.86
Henan	237.22	100.21	5.34	9.04	0.66	4.98	0.64
Hubei	283.11	144.24	10.09	15.20	1.56	3.58	5.76
Hunan	289.68	142.79	9.05	16.57	3.00	2.99	5.38
Guangdong	244.69	111.88	6.52	18.90	8.75	3.31	12.47
Guangxi	237.19	116.58	3.83	11.98	5.36	1.15	2.47
Hainan	259.20	52.49	2.74	8.88	4.37	0.72	9.79
Chongqing	245.50	173.02	5.46	23.91	1.39	3.39	1.31
Sichuan	244.88	129.91	5.99	21.77	1.88	2.65	1.15
Guizhou	226.22	121.57	5.22	19.46	0.77	0.97	0.29
Yunnan	241.48	123.21	4.53	21.54	1.92	1.85	0.84
Tibet	234.29	39.09	6.64	13.69	0.03	1.28	...
Shaanxi	226.02	56.87	6.09	5.88	0.28	1.85	0.20
Gansu	237.98	25.33	4.67	6.52	0.28	1.00	0.06
Qinghai	270.20	40.32	7.90	16.85	0.14	0.42	0.13
Ningxia	247.63	73.20	7.06	10.60	0.94	1.34	0.41
Xinjiang	233.87	78.04	6.27	9.09	1.32	1.01	0.41

Source: China Statistical Yearbook 1998.

Table C.12 Per capita food consumption data for rural households by regions, 1998

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	173.42	89.36	10.29	13.42	1.49	7.92	4.52
Tianjin	216.59	73.80	7.96	10.17	0.85	8.41	6.96
Hebei	209.62	70.87	5.50	6.49	0.38	4.85	1.85
Shanxi	220.50	80.10	4.69	5.01	0.35	3.89	0.34
Inner Mongolia	268.02	92.25	3.34	20.27	0.77	3.13	1.25
Liaoning	243.67	204.26	7.05	13.71	1.23	7.35	4.70
Jilin	249.44	96.72	6.74	6.74	1.41	7.92	3.19
Heilongjiang	275.40	108.99	5.95	5.68	1.84	6.92	3.09
Shanghai	243.60	80.75	6.80	16.10	5.75	7.89	12.04
Jiangsu	262.38	110.27	8.26	11.17	4.00	6.69	8.14
Zhejiang	257.47	72.74	4.10	14.49	4.18	4.55	11.51
Anhui	245.17	78.76	6.75	7.82	2.98	4.24	3.37
Fujian	266.67	131.18	4.83	13.84	5.76	3.09	9.45
Jiangxi	301.40	154.42	5.87	11.99	2.38	2.82	4.16
Shandong	232.37	114.41	5.65	7.33	2.02	10.33	3.78
Henan	229.67	121.42	4.74	10.77	0.85	6.83	0.73
Hubei	276.42	160.24	10.50	17.31	1.76	3.78	5.31
Hunan	300.63	161.76	9.21	18.95	2.96	3.42	4.60
Guangdong	258.38	118.45	6.58	19.52	8.89	2.96	12.74
Guangxi	240.72	120.11	4.45	13.31	5.76	1.12	2.67
Hainan	247.68	57.18	3.18	8.74	4.68	0.91	9.65
Chongqing	239.45	171.47	5.92	24.89	1.31	4.02	1.19
Sichuan	244.42	136.04	6.06	22.10	1.98	2.65	1.36
Guizhou	223.85	122.21	4.86	23.06	0.88	1.10	0.29
Yunnan	244.46	113.55	4.76	22.55	1.81	1.75	0.90
Tibet	232.92	34.39	6.65	13.67	0.01	0.66	0.01
Shaanxi	228.70	63.45	5.69	6.18	0.24	1.71	0.21
Gansu	255.19	35.51	5.29	6.58	0.57	1.48	0.13
Qinghai	253.12	42.04	9.14	16.51	0.12	0.52	0.40
Ningxia	259.67	96.58	7.15	10.21	1.34	1.83	0.35
Xinjiang	254.54	81.15	6.91	10.79	1.16	1.17	0.43

Source: China Statistical Yearbook 1999.

Table C.13 Per capita food consumption data for rural households by regions, 1999

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	179.62	95.97	9.98	14.69	1.51	8.23	4.10
Tianjin	220.74	88.49	7.54	11.26	0.72	8.99	7.09
Hebei	215.02	65.21	5.38	7.50	0.34	5.13	1.97
Shanxi	212.95	73.15	4.89	4.06	0.11	3.80	0.35
Inner Mongolia	249.49	78.90	3.91	22.12	0.81	3.16	1.38
Liaoning	227.56	210.00	6.78	15.21	1.25	7.79	4.31
Jilin	251.55	105.73	5.16	8.76	1.22	6.11	3.30
Heilongjiang	288.95	103.91	5.94	6.92	1.71	7.10	2.99
Shanghai	253.22	81.30	7.33	16.08	6.32	7.33	14.19
Jiangsu	265.41	113.76	8.14	11.57	3.43	6.13	7.72
Zhejiang	241.82	74.07	5.20	15.91	4.15	4.48	12.43
Anhui	251.14	78.67	6.63	8.32	2.95	4.25	3.91
Fujian	251.27	119.31	4.22	14.08	6.10	3.17	9.45
Jiangxi	307.05	159.38	7.82	13.46	2.40	3.01	4.60
Shandong	245.74	118.44	5.59	8.48	2.89	12.50	3.59
Henan	235.31	118.58	4.20	8.72	0.76	7.82	0.90
Hubei	258.69	164.13	10.10	18.45	2.11	3.93	5.82
Hunan	294.69	157.70	9.28	18.04	2.98	2.70	4.46
Guangdong	258.20	118.75	7.23	19.96	8.78	3.00	12.79
Guangxi	240.75	125.00	4.24	13.59	6.16	1.01	2.83
Hainan	241.17	57.37	3.33	9.08	5.67	0.82	9.87
Chongqing	239.57	169.03	6.00	26.36	1.41	4.86	1.84
Sichuan	236.72	133.27	5.99	25.04	2.15	2.74	1.52
Guizhou	230.11	131.45	5.31	23.28	0.88	1.08	0.31
Yunnan	245.11	115.97	4.66	22.76	2.51	1.78	1.04
Tibet	244.78	32.04	6.75	12.29	0.02	0.65	0.03
Shaanxi	214.93	56.51	5.67	7.22	0.30	1.69	0.23
Gansu	253.38	25.79	3.91	7.29	0.43	1.25	0.07
Qinghai	257.81	41.92	9.93	17.13	0.27	0.52	0.38
Ningxia	253.63	78.43	7.25	11.44	1.44	1.95	0.65
Xinjiang	243.48	82.54	7.53	11.06	1.08	1.11	0.44

Source: China Statistical Yearbook 2000.

Table C.14 Per capita food consumption data for rural households by regions, 2000

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	137.06	110.10	9.40	15.01	2.03	8.73	3.86
Tianjin	214.53	73.60	9.54	10.81	0.85	9.80	6.17
Hebei	213.76	61.45	5.91	7.16	0.37	5.09	1.79
Shanxi	241.55	70.58	6.01	5.22	0.30	5.63	0.46
Inner Mongolia	252.09	83.13	4.79	20.16	0.88	3.34	1.22
Liaoning	222.18	199.54	7.14	15.17	1.84	9.51	4.74
Jilin	220.28	92.25	6.48	9.54	1.53	8.09	3.09
Heilongjiang	252.30	110.52	7.46	8.60	2.10	7.04	2.93
Shanghai	222.28	92.41	7.99	18.40	7.96	10.71	14.51
Jiangsu	288.09	115.69	9.56	12.38	4.44	8.22	7.74
Zhejiang	227.26	85.94	5.59	17.38	5.92	5.52	12.84
Anhui	270.24	80.28	7.66	9.50	3.57	5.56	3.67
Fujian	260.70	131.33	5.25	18.49	6.64	4.43	12.23
Jiangxi	303.62	148.72	10.31	12.64	2.49	3.26	3.73
Shandong	235.39	120.53	8.58	9.33	2.96	12.66	4.32
Henan	255.82	146.54	5.09	6.55	1.72	9.73	0.96
Hubei	300.59	155.06	10.34	16.94	2.19	3.94	6.42
Hunan	287.46	156.18	9.68	18.74	3.70	3.56	4.76
Guangdong	252.79	116.39	5.93	22.39	9.23	2.78	11.72
Guangxi	231.81	118.64	6.20	14.08	6.29	1.28	3.08
Hainan	236.07	67.46	6.01	13.83	7.09	1.25	11.96
Chongqing	210.00	175.60	5.59	26.54	2.01	4.58	1.61
Sichuan	249.11	143.36	6.57	24.54	2.81	3.69	1.53
Guizhou	227.15	139.14	4.97	24.35	1.00	1.25	0.34
Yunnan	238.25	104.07	4.63	22.96	2.11	1.78	1.05
Tibet	280.17	23.58	6.17	11.73	0.01	0.64	0.01
Shaanxi	221.39	61.36	6.27	7.17	0.29	2.22	0.24
Gansu	256.53	44.62	5.95	10.01	0.73	1.88	0.14
Qinghai	270.79	42.60	9.09	19.63	0.37	0.69	0.83
Ningxia	248.64	91.19	7.11	11.56	1.85	2.37	0.51
Xinjiang	244.83	89.24	9.64	10.93	1.36	1.20	0.47

Source: China Statistical Yearbook 2000.

Table C.15 Per capita food consumption data for rural households by regions, 2001

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	133.54	108.87	13.96	14.74	1.81	10.10	4.80
Tianjin	207.47	117.61	10.30	10.84	0.93	12.01	7.30
Hebei	205.41	63.37	6.79	7.30	0.43	5.23	1.98
Shanxi	247.59	74.29	6.04	4.51	0.21	5.32	0.47
Inner Mongolia	220.60	79.56	4.25	17.03	1.10	3.48	1.25
Liaoning	227.35	193.29	7.42	14.42	1.74	8.59	4.38
Jilin	209.59	119.54	6.01	9.32	1.79	7.83	4.27
Heilongjiang	227.03	102.96	6.73	7.15	2.06	6.16	3.22
Shanghai	230.48	92.43	8.05	18.13	7.88	9.76	16.59
Jiangsu	266.16	109.77	9.54	11.41	4.18	6.25	7.72
Zhejiang	232.62	86.54	5.61	16.25	5.87	5.03	13.56
Anhui	257.00	84.00	7.75	10.86	3.74	5.23	4.02
Fujian	246.32	119.09	4.83	18.13	6.37	4.23	12.70
Jiangxi	283.21	137.05	9.86	13.10	2.48	3.17	4.03
Shandong	235.73	96.44	7.16	8.04	2.61	11.39	4.52
Henan	224.84	149.11	5.10	11.65	1.69	8.96	1.11
Hubei	274.01	152.30	9.69	17.54	2.01	3.95	6.56
Hunan	278.00	161.47	9.25	18.98	3.77	3.64	4.98
Guangdong	238.52	119.89	6.64	21.94	9.27	2.94	11.79
Guangxi	226.46	116.72	6.12	13.80	6.62	1.21	3.31
Hainan	244.45	67.70	8.51	13.13	8.03	1.40	12.83
Chongqing	218.04	158.51	6.61	25.12	2.10	4.63	1.81
Sichuan	233.00	141.98	6.01	24.77	2.68	3.53	1.55
Guizhou	211.54	131.18	4.64	25.26	1.16	1.27	0.32
Yunnan	229.74	99.08	5.22	24.85	2.30	1.72	1.19
Tibet	286.66	26.23	5.79	10.66	0.03	0.47	0.02
Shaanxi	212.13	56.68	6.49	6.75	0.29	2.13	0.22
Gansu	247.17	38.42	5.85	9.92	0.76	2.74	0.20
Qinghai	257.98	40.50	10.24	20.58	0.46	0.76	0.33
Ningxia	236.54	82.64	8.05	10.27	2.26	2.49	0.63
Xinjiang	243.16	77.75	8.71	10.77	1.51	1.17	0.33

Source: China Statistical Yearbook 2002.

Table C.16 Per capita food consumption data for rural households by regions, 2002

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	143.83	104.09	11.94	15.03	3.57	9.74	4.24
Tianjin	160.09	90.78	11.65	10.65	0.73	9.98	7.09
Hebei	211.05	58.78	6.85	7.40	0.40	5.63	2.18
Shanxi	228.82	80.54	6.42	5.21	0.24	6.11	0.55
Inner Mongolia	223.54	75.08	4.50	18.60	1.20	3.48	1.52
Liaoning	216.68	199.40	7.80	15.09	1.67	8.84	4.64
Jilin	216.46	116.56	7.11	12.05	2.05	7.67	3.73
Heilongjiang	232.81	103.59	7.69	7.69	2.50	6.45	3.63
Shanghai	230.85	87.12	8.66	16.79	8.25	10.70	16.36
Jiangsu	265.31	108.16	9.72	12.31	4.16	6.18	8.54
Zhejiang	222.58	87.32	5.93	16.13	5.47	4.89	14.03
Anhui	243.59	82.01	7.82	9.37	3.86	4.74	4.63
Fujian	228.08	112.88	5.72	18.26	5.34	3.54	12.58
Jiangxi	273.80	140.73	9.51	12.86	2.47	2.90	4.42
Shandong	236.22	108.00	7.18	8.05	2.64	11.47	3.88
Henan	239.69	154.50	5.80	12.12	1.77	9.30	1.09
Hubei	274.56	150.61	10.75	18.47	2.07	3.47	7.31
Hunan	265.28	170.22	9.25	19.37	3.85	3.39	5.95
Guangdong	236.02	120.62	7.10	21.56	8.97	2.70	12.04
Guangxi	219.60	117.61	6.30	14.33	7.02	1.12	3.55
Hainan	335.52	67.54	19.49	15.11	8.32	0.60	16.30
Chongqing	227.78	157.28	6.67	25.82	2.33	4.60	1.83
Sichuan	235.67	146.98	6.79	25.33	2.81	3.64	1.55
Guizhou	207.92	126.01	4.67	27.99	1.14	1.22	0.32
Yunnan	225.41	102.49	5.36	24.11	2.35	1.73	1.25
Tibet	276.15	24.01	8.37	12.05	0.03	0.61	N.A.
Shaanxi	201.63	53.65	6.48	6.64	0.34	2.06	0.27
Gansu	249.98	40.75	6.29	9.31	0.96	2.26	0.22
Qinghai	229.04	42.56	9.16	20.30	0.45	0.68	0.45
Ningxia	233.96	74.59	7.88	11.01	2.74	2.69	0.77
Xinjiang	249.56	88.47	10.38	11.04	1.36	1.10	0.35

Note: N.A.: not available.

Source: China Statistical Yearbook 2003.

Table C.17 Per capita food consumption data for rural households by regions, 2003

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	134.05	92.78	9.15	14.60	2.17	10.13	4.25
Tianjin	150.20	69.99	10.00	11.07	0.84	10.80	8.35
Hebei	216.72	55.97	6.59	7.10	0.54	6.36	2.25
Shanxi	218.91	80.87	5.72	5.36	0.24	6.15	0.47
Inner Mongolia	207.30	70.77	2.79	21.18	1.41	3.82	1.45
Liaoning	194.39	178.59	5.90	16.45	2.51	9.59	4.49
Jilin	255.99	115.20	6.27	11.42	3.23	8.64	3.60
Heilongjiang	195.08	111.70	7.62	7.85	2.61	6.26	3.35
Shanghai	189.44	76.60	8.59	16.37	7.40	7.51	16.11
Jiangsu	251.98	109.12	8.27	12.05	4.50	6.72	9.09
Zhejiang	208.46	83.91	5.81	16.42	6.03	5.33	14.64
Anhui	228.35	80.97	6.87	9.07	4.27	5.04	5.43
Fujian	198.27	99.92	5.19	16.51	5.14	3.55	13.30
Jiangxi	264.80	144.22	8.77	13.24	3.31	3.50	5.19
Shandong	229.06	118.19	6.96	8.09	2.70	11.61	4.01
Henan	236.97	100.11	4.22	6.48	1.23	8.01	1.35
Hubei	227.39	159.76	9.40	19.86	2.74	3.86	8.10
Hunan	247.21	149.44	8.35	17.51	3.89	3.28	6.89
Guangdong	233.75	130.22	6.73	22.27	10.40	2.83	13.30
Guangxi	205.65	108.94	4.92	14.44	7.33	1.12	3.57
Hainan	236.31	86.61	5.70	15.40	9.77	1.31	14.75
Chongqing	215.31	154.70	3.34	28.06	2.21	3.98	1.93
Sichuan	223.81	180.65	5.21	28.05	3.59	4.73	1.91
Guizhou	201.36	130.67	3.85	28.01	1.18	1.20	0.33
Yunnan	195.37	90.80	3.03	26.41	2.67	1.56	1.21
Tibet	266.09	15.27	3.22	11.31	0.02	0.41	N.A.
Shaanxi	193.30	50.69	5.83	6.63	0.32	2.29	0.29
Gansu	235.23	40.02	4.95	10.80	1.11	2.14	0.24
Qinghai	219.54	53.93	8.25	30.44	0.55	0.77	0.53
Ningxia	224.23	84.38	7.22	11.33	2.81	2.74	0.51
Xinjiang	236.50	75.12	9.37	11.88	1.51	1.27	0.40

Note: N.A.: not available.

Source: China Statistical Yearbook 2004

Table C.18 Per capita food consumption data for rural households by regions, 2004

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	114.58	86.44	8.44	14.85	1.86	9.24	3.88
Tianjin	151.67	81.31	9.96	10.55	0.85	10.18	7.24
Hebei	214.80	57.89	4.95	6.86	0.53	6.00	2.21
Shanxi	221.24	82.91	5.09	5.67	0.27	6.42	0.58
Inner Mongolia	203.70	75.39	3.61	25.26	1.61	3.90	1.49
Liaoning	204.04	173.72	6.95	17.18	1.99	9.77	4.71
Jilin	200.26	141.17	6.05	11.56	4.06	8.53	3.47
Heilongjiang	190.59	110.47	8.34	7.11	2.63	5.77	2.89
Shanghai	170.48	66.78	8.21	15.28	5.12	5.62	15.50
Jiangsu	232.94	117.12	5.54	11.50	4.54	6.56	8.82
Zhejiang	204.40	81.40	5.45	15.01	5.36	5.37	14.90
Anhui	208.92	81.46	4.50	8.37	3.73	4.62	4.89
Fujian	229.17	96.62	4.91	15.71	4.97	3.46	13.44
Jiangxi	264.20	135.52	7.75	12.90	2.84	3.12	4.58
Shandong	227.23	118.71	6.02	6.89	2.63	9.61	4.10
Henan	237.43	92.39	3.64	9.17	1.24	7.49	1.27
Hubei	221.31	147.73	3.52	17.85	2.48	3.99	7.21
Hunan	247.05	145.68	10.96	17.06	4.16	3.39	5.40
Guangdong	229.57	131.02	7.23	21.81	10.17	2.63	13.43
Guangxi	202.73	106.31	4.02	12.72	7.24	1.09	3.52
Hainan	206.16	67.44	4.26	13.26	9.09	1.28	16.16
Chongqing	212.04	166.85	3.08	27.95	2.78	6.10	2.17
Sichuan	216.33	173.01	3.61	28.99	3.88	4.84	1.92
Guizhou	195.71	136.27	3.09	27.75	1.36	1.22	0.35
Yunnan	189.75	97.66	2.49	25.67	2.58	1.41	1.15
Tibet	245.61	14.51	2.70	10.62	N.A.	0.43	N.A.
Shaanxi	200.37	54.88	5.43	6.55	0.36	2.06	0.29
Gansu	251.27	40.55	1.98	10.04	0.83	1.76	0.25
Qinghai	219.69	47.54	1.88	22.54	0.44	0.53	0.56
Ningxia	226.73	79.82	4.57	11.84	2.37	2.05	0.33
Xinjiang	232.10	68.33	8.94	11.70	1.55	1.02	0.33

Note: N.A.: not available.

Source: China Statistical Yearbook 2004

Table C.19 Per capita food consumption data for rural households by regions, 2004

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	128.61	92.41	9.35	17.41	2.93	9.32	4.89
Tianjin	152.65	79.00	9.44	12.05	0.65	8.94	7.45
Hebei	200.00	57.70	6.75	8.00	0.75	6.27	2.48
Shanxi	214.90	80.72	5.54	5.54	0.41	5.74	0.67
Inner Mongolia	207.43	76.93	4.35	26.26	2.25	4.29	1.56
Liaoning	195.35	173.58	7.21	17.86	2.08	8.58	5.74
Jilin	175.02	138.09	6.81	14.41	4.29	8.60	4.02
Heilongjiang	183.03	112.64	9.24	9.58	3.32	5.74	3.77
Shanghai	145.49	70.59	8.62	19.47	8.90	7.66	19.12
Jiangsu	207.22	108.87	4.95	14.07	5.65	6.38	9.97
Zhejiang	184.28	82.03	5.57	17.77	6.45	4.59	15.47
Anhui	213.46	78.70	6.31	10.70	4.64	4.69	5.18
Fujian	190.36	90.48	4.85	18.88	6.16	3.40	14.27
Jiangxi	243.94	136.40	7.00	15.61	3.75	3.50	5.43
Shandong	194.20	72.86	9.70	8.48	2.66	10.44	4.55
Henan	210.91	100.75	4.36	6.43	1.57	8.48	1.30
Hubei	214.80	152.47	3.70	21.07	3.02	4.14	8.11
Hunan	237.95	140.07	8.97	20.56	4.61	3.38	6.23
Guangdong	228.28	122.02	6.40	20.91	10.08	2.76	14.48
Guangxi	189.45	101.68	5.05	15.44	9.19	1.05	4.21
Hainan	188.79	71.19	4.34	18.49	10.02	1.23	15.07
Chongqing	215.62	152.33	4.49	30.29	3.82	6.53	2.30
Sichuan	220.98	155.89	4.89	31.59	4.40	4.84	2.19
Guizhou	186.35	135.51	4.01	30.55	1.69	1.28	0.36
Yunnan	192.17	98.30	3.26	28.51	2.93	1.67	1.06
Tibet	262.02	23.03	4.53	54.88	N.A.	0.64	N.A.
Shaanxi	205.22	54.01	6.47	8.02	0.43	2.21	0.35
Gansu	261.64	43.57	3.61	16.56	0.81	1.66	0.21
Qinghai	232.46	43.63	3.46	20.77	0.56	0.54	0.35
Ningxia	233.26	82.68	4.75	13.25	2.50	2.17	0.45
Xinjiang	235.37	67.89	10.90	12.22	1.70	1.00	0.41

Note: N.A.: not available.

Source: China Statistical Yearbook 2005

Table C.20 Per capita food consumption data for rural households by regions, 2005

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	128.61	92.41	9.35	17.41	2.93	9.32	4.89
Tianjin	152.65	79.00	9.44	12.05	0.65	8.94	7.45
Hebei	200.00	57.70	6.75	8.00	0.75	6.27	2.48
Shanxi	214.90	80.72	5.54	5.54	0.41	5.74	0.67
Inner Mongolia	207.43	76.93	4.35	26.26	2.25	4.29	1.56
Liaoning	195.35	173.58	7.21	17.86	2.08	8.58	5.74
Jilin	175.02	138.09	6.81	14.41	4.29	8.60	4.02
Heilongjiang	183.03	112.64	9.24	9.58	3.32	5.74	3.77
Shanghai	145.49	70.59	8.62	19.47	8.90	7.66	19.12
Jiangsu	207.22	108.87	4.95	14.07	5.65	6.38	9.97
Zhejiang	184.28	82.03	5.57	17.77	6.45	4.59	15.47
Anhui	213.46	78.70	6.31	10.70	4.64	4.69	5.18
Fujian	190.36	90.48	4.85	18.88	6.16	3.40	14.27
Jiangxi	243.94	136.40	7.00	15.61	3.75	3.50	5.43
Shandong	194.20	72.86	9.70	8.48	2.66	10.44	4.55
Henan	210.91	100.75	4.36	6.43	1.57	8.48	1.30
Hubei	214.80	152.47	3.70	21.07	3.02	4.14	8.11
Hunan	237.95	140.07	8.97	20.56	4.61	3.38	6.23
Guangdong	228.28	122.02	6.40	20.91	10.08	2.76	14.48
Guangxi	189.45	101.68	5.05	15.44	9.19	1.05	4.21
Hainan	188.79	71.19	4.34	18.49	10.02	1.23	15.07
Chongqing	215.62	152.33	4.49	30.29	3.82	6.53	2.30
Sichuan	220.98	155.89	4.89	31.59	4.40	4.84	2.19
Guizhou	186.35	135.51	4.01	30.55	1.69	1.28	0.36
Yunnan	192.17	98.30	3.26	28.51	2.93	1.67	1.06
Tibet	262.02	23.03	4.53	54.88	N.A.	0.64	N.A.
Shaanxi	205.22	54.01	6.47	8.02	0.43	2.21	0.35
Gansu	261.64	43.57	3.61	16.56	0.81	1.66	0.21
Qinghai	232.46	43.63	3.46	20.77	0.56	0.54	0.35
Ningxia	233.26	82.68	4.75	13.25	2.50	2.17	0.45
Xinjiang	235.37	67.89	10.90	12.22	1.70	1.00	0.41

Note: N.A.: not available.

Source: China Statistical Yearbook 2006.

Table C.21 Per capita food consumption data for rural households by regions, 2006

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	109.35	91.46	8.73	19.24	2.57	9.23	5.40
Tianjin	140.50	66.21	9.37	13.36	0.64	9.53	8.53
Hebei	189.42	61.61	7.07	8.40	0.56	6.97	2.55
Shanxi	200.59	78.81	6.21	6.38	0.38	6.01	0.66
Inner Mongolia	196.41	77.94	3.85	25.75	1.63	4.51	1.72
Liaoning	193.03	171.78	6.86	19.21	1.77	9.35	6.18
Jilin	200.49	140.65	6.43	13.47	3.66	8.20	4.23
Heilongjiang	166.93	114.73	8.67	9.36	2.88	5.90	3.50
Shanghai	160.04	68.71	8.17	20.02	7.72	7.68	20.64
Jiangsu	217.16	113.26	5.29	14.07	5.51	6.91	10.47
Zhejiang	180.02	83.34	5.52	17.87	5.90	4.76	16.00
Anhui	209.59	76.28	6.24	10.71	4.03	5.01	5.23
Fujian	200.16	89.98	4.91	19.11	6.15	3.62	14.27
Jiangxi	253.74	130.96	6.48	15.23	3.59	3.27	5.60
Shandong	199.13	77.48	8.97	8.99	2.49	10.81	4.42
Henan	210.65	99.63	4.45	7.19	1.60	10.10	1.39
Hubei	212.79	143.75	3.56	21.44	2.91	4.15	8.51
Hunan	230.36	134.33	7.82	19.97	4.47	3.36	5.97
Guangdong	213.84	115.72	5.52	24.61	10.67	2.77	13.83
Guangxi	183.42	104.76	4.56	15.22	8.91	1.09	3.87
Hainan	207.45	63.68	4.00	18.59	10.05	1.47	15.16
Chongqing	204.33	144.67	4.08	30.39	3.34	6.87	2.39
Sichuan	209.15	147.35	4.53	29.93	4.09	4.91	2.30
Guizhou	184.19	134.44	3.69	29.21	1.80	1.41	0.49
Yunnan	199.72	93.08	3.21	31.05	3.01	1.86	1.31
Tibet	279.72	24.23	7.11	18.57	0.00	0.42	0.00
Shaanxi	193.90	57.47	7.07	7.78	0.42	2.61	0.35
Gansu	260.15	39.10	3.73	16.13	0.86	1.75	0.29
Qinghai	220.81	42.69	3.59	25.07	0.80	0.85	0.26
Ningxia	212.33	76.55	6.45	13.41	2.78	3.02	0.58
Xinjiang	225.15	63.78	10.76	13.54	1.39	1.21	0.42

Source: China Statistical Yearbook 2007

Table C.22 Per capita food consumption data for rural households by regions, 2007

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	109.97	94.85	9.18	16.68	2.91	9.20	5.12
Tianjin	139.80	69.99	9.97	10.76	1.11	9.84	8.62
Hebei	188.48	55.17	7.18	6.80	0.72	6.33	2.60
Shanxi	195.71	74.08	6.40	5.56	0.57	5.95	0.81
Inner Mongolia	198.26	77.74	3.79	23.62	2.06	4.38	1.93
Liaoning	190.31	168.25	7.49	16.02	2.58	8.87	5.80
Jilin	188.77	132.48	6.84	10.58	3.89	7.49	4.41
Heilongjiang	159.10	105.42	10.79	7.41	3.32	5.62	4.17
Shanghai	157.45	71.56	9.00	18.10	8.40	7.93	19.40
Jiangsu	213.03	114.45	5.47	12.16	6.09	6.32	11.38
Zhejiang	178.14	82.41	6.38	14.92	6.26	4.63	16.89
Anhui	194.65	76.40	6.38	9.16	4.59	4.94	5.80
Fujian	186.03	92.50	5.64	16.51	6.22	3.39	14.18
Jiangxi	243.14	137.71	7.41	13.49	4.08	3.34	6.14
Shandong	194.23	79.34	7.07	7.59	2.84	10.19	4.68
Henan	205.30	102.06	4.59	6.10	1.76	8.94	1.48
Hubei	207.35	143.57	3.77	18.35	3.30	4.17	9.38
Hunan	223.24	131.46	7.96	16.91	5.04	3.24	7.03
Guangdong	202.40	110.42	5.70	21.74	10.99	2.72	14.31
Guangxi	185.88	102.84	4.27	13.14	9.53	1.29	4.18
Hainan	210.84	98.86	4.19	15.07	9.99	1.50	15.16
Chongqing	193.09	144.41	4.73	27.65	3.45	5.77	3.13
Sichuan	203.05	132.33	4.56	26.92	4.73	4.82	2.63
Guizhou	181.27	130.60	3.23	26.24	1.96	1.25	0.48
Yunnan	180.39	86.44	3.07	29.15	3.23	1.87	1.58
Tibet	288.40	27.21	7.72	17.17	0.06	0.76	0.01
Shaanxi	185.55	52.74	6.83	6.33	0.46	2.17	0.44
Gansu	254.95	38.86	3.67	13.54	0.75	1.66	0.28
Qinghai	211.22	42.60	3.03	23.41	1.01	0.73	0.30
Ningxia	202.35	76.50	6.28	12.36	3.48	2.31	0.67
Xinjiang	221.90	70.77	10.82	12.47	1.62	1.09	0.48

Source: China Statistical Yearbook 2008.

Table C.23 Per capita food consumption data for rural households by regions, 2008

Unit: kg/capita/year

Region	Grain	Vegetables	Edible oil	Meat	Poultry	Eggs	Aquatic products
Beijing	100.63	92.94	10.31	15.89	3.41	10.12	4.93
Tianjin	138.72	59.28	10.76	10.43	1.32	11.23	8.52
Hebei	185.94	59.75	7.72	6.17	1.05	7.60	2.62
Shanxi	188.56	73.68	6.84	5.08	0.74	6.60	0.93
Inner Mongolia	195.70	79.25	4.32	22.73	2.66	5.92	1.88
Liaoning	196.87	162.79	7.87	16.65	2.68	10.96	5.50
Jilin	177.71	113.23	8.01	9.62	3.73	9.21	4.16
Heilongjiang	166.44	95.71	11.24	7.87	3.75	6.86	4.22
Shanghai	139.76	65.58	9.18	17.19	9.18	8.36	18.20
Jiangsu	201.77	113.58	6.10	11.85	6.68	7.68	10.99
Zhejiang	182.96	80.81	6.45	14.28	6.70	4.99	16.66
Anhui	190.45	109.63	6.87	8.74	5.37	5.96	5.67
Fujian	179.29	93.85	6.43	14.88	7.00	3.84	14.66
Jiangxi	238.65	142.39	6.77	12.05	4.16	3.47	5.78
Shandong	194.09	78.98	7.91	7.40	3.15	11.42	4.90
Henan	244.98	121.66	5.17	5.01	2.38	10.40	1.45
Hubei	192.83	132.58	4.11	18.01	3.23	4.69	8.71
Hunan	227.76	138.86	7.80	15.85	5.42	3.64	6.32
Guangdong	194.27	109.40	6.40	19.61	11.93	2.86	13.70
Guangxi	191.63	100.36	4.13	11.36	9.80	1.32	3.92
Hainan	188.76	63.44	4.11	13.93	12.17	2.61	17.59
Chongqing	189.64	135.37	4.83	25.44	4.22	6.16	2.85
Sichuan	182.57	115.09	4.31	24.94	5.68	4.57	2.73
Guizhou	183.78	133.36	3.36	25.18	2.25	1.72	0.36
Yunnan	186.68	97.84	3.59	27.95	4.87	2.41	1.72
Tibet	302.82	20.57	7.65	16.38	0.07	0.78	N.A.
Shaanxi	182.60	51.56	6.76	6.57	0.56	2.33	0.41
Gansu	246.07	42.37	3.94	12.51	1.15	2.17	0.29
Qinghai	212.35	39.46	2.28	18.96	1.09	0.82	0.32
Ningxia	209.37	74.77	7.95	12.10	4.52	3.17	0.70
Xinjiang	237.15	69.34	9.90	10.82	1.90	1.37	0.46

Note: N.A.: not available.

Source: China Statistical Yearbook 2009.

Table C. 24 Prices of agricultural products at regional rural market fairs (RMFs), 2008

Unit: yuan/kg

Region	Milled rice	Wheat flour	Chinese cabbage	Tomato	Green bell	Pork	Beef	Mutton	Silvercarp	Hairtail
Hebei	3.21	2.23	1.04	2.53	3.62	23.01	28.80	32.42	12.17	11.98
Shanxi	3.98	2.25	1.15	3.04	4.20	21.92	27.58	31.01	13.54	13.41
Inner Mongolia	2.76	2.35	1.12	3.13	4.18	21.70	27.73	27.73	12.53	9.42
Liaoning	3.01	2.76	1.35	3.18	4.10	23.28	29.21	31.63	11.81	10.53
Jilin	2.92	2.88	1.38	3.70	4.86	20.99	27.81	30.56	12.13	9.94
Heilongjiang	2.95	2.66	1.16	3.35	4.08	21.99	28.22	29.12	12.21	9.41
Jiangsu	3.08	2.59	1.35	3.39	3.53	24.10	31.52	31.94	8.87	12.52
Zhejiang	3.17	2.58	1.74	4.43	5.27	24.78	40.39	35.76	9.73	17.81
Anhui	3.24	2.50	1.18	3.14	3.05	24.64	31.13	30.97	9.75	11.66
Fujian	3.80	3.09	2.05	3.31	4.57	22.79	37.31	40.80	11.89	15.13
Jiangxi	3.96	3.12	1.98	3.61	3.75	25.26	36.96	37.63	8.14	11.99
Shandong	3.26	2.26	0.96	2.58	3.51	22.93	30.09	33.87	11.58	11.00
Henan	3.44	2.12	1.09	2.67	3.11	23.70	31.47	33.92	11.12	10.14
Hubei	3.38	2.83	1.76	3.88	3.85	25.22	30.55	26.92	7.36	12.92
Hunan	3.80	3.64	1.87	3.61	3.96	23.31	31.78	32.07	9.93	N.A.
Guangdong	4.50	3.65	2.88	3.84	4.56	25.70	33.38	30.84	9.23	20.29
Guangxi	3.61	3.25	2.37	3.00	3.98	24.22	33.72	37.57	11.22	13.00
Hainan	N.A.	3.88	2.82	3.23	3.62	27.50	33.54	49.00	7.37	18.82
Sichuan	3.54	2.89	1.53	3.11	3.43	22.66	29.85	31.77	12.68	13.20
Guizhou	3.28	3.00	1.62	2.84	3.11	24.67	32.82	33.57	15.81	15.08
Yunnan	3.30	2.92	1.45	2.33	3.63	23.98	28.78	28.41	13.32	N.A.
Shaanxi	3.75	2.50	1.09	2.66	3.73	21.68	32.12	30.36	12.80	12.21
Gansu	4.15	2.52	1.33	2.98	4.15	22.63	32.05	30.97	13.35	13.93
Qinghai	4.06	2.65	1.74	3.75	7.08	22.25	31.83	28.58	14.33	14.33
Ningxia	3.28	2.89	1.18	2.49	3.52	23.54	30.50	30.50	12.33	14.07
Xinjiang	3.40	2.75	1.34	3.10	4.87	22.63	28.96	33.19	12.82	12.84

Note: N.A.: not available.

Source: China Yearbook of Agricultural Price Survey 2009.

Table C.25 Consumer Price indexes (CPI) for food subgroups in rural areas, 1996

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	107.50	119.80	92.00	100.90	N.A.	N.A.	116.70	105.10	107.00
Shanxi	109.00	119.60	93.90	99.50	N.A.	N.A.	119.10	107.70	109.00
Inner Mongolia	107.70	106.00	88.30	95.70	N.A.	N.A.	116.20	103.60	104.20
Liaoning	103.20	116.00	85.70	95.80	N.A.	N.A.	118.00	101.30	103.10
Jilin	103.30	114.30	87.00	94.60	N.A.	N.A.	118.80	96.10	109.60
Heilongjiang	100.30	116.10	89.60	96.50	N.A.	N.A.	110.50	101.00	100.90
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	107.30	139.30	92.30	105.40	N.A.	N.A.	115.50	107.50	111.30
Zhejiang	103.40	111.00	94.20	107.30	N.A.	N.A.	116.80	107.80	109.60
Anhui	109.20	125.60	93.00	105.90	N.A.	N.A.	112.60	102.20	107.30
Fujian	100.80	106.50	98.90	107.20	N.A.	N.A.	116.30	106.40	108.80
Jiangxi	106.80	115.30	93.50	108.70	N.A.	N.A.	113.90	108.10	105.40
Shandong	107.30	132.30	89.20	106.00	N.A.	N.A.	117.60	102.20	109.00
Henan	107.00	152.80	93.60	104.40	N.A.	N.A.	118.10	109.40	104.90
Hubei	102.00	122.10	89.80	106.10	N.A.	N.A.	114.90	104.50	105.10
Hunan	102.50	104.90	97.30	108.90	N.A.	N.A.	116.00	112.60	109.60
Guangdong	101.20	105.50	97.50	107.20	N.A.	N.A.	114.90	103.00	106.20
Guangxi	100.20	118.80	94.70	104.00	N.A.	N.A.	117.70	104.90	111.30
Hainan	103.20	98.20	97.70	102.60	N.A.	N.A.	113.40	100.30	121.50
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	107.80	126.80	91.80	107.30	N.A.	N.A.	113.20	117.70	107.30
Guizhou	104.80	125.00	88.70	105.20	N.A.	N.A.	115.10	107.90	105.20
Yunnan	106.20	128.50	93.30	106.40	N.A.	N.A.	110.60	104.60	109.20
Tibet	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Shaanxi	111.40	130.20	89.00	101.70	N.A.	N.A.	119	104.10	107.40
Gansu	114.10	120.40	91.10	99.80	N.A.	N.A.	110.8	99.00	109.00
Qinghai	115.00	104.50	85.70	100.20	N.A.	N.A.	115.1	101.90	108.60
Ningxia	107.80	122.40	89.50	98.40	N.A.	N.A.	113.8	99.70	111.90
Xinjiang	117.30	127.60	87.80	100.80	N.A.	N.A.	113.3	101.20	114.60

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 1997.

Table C.26 Consumer Price indexes (CPI) for food subgroups in rural areas, 1997

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	90.50	99.70	104.80	115.00	N.A.	N.A.	77.90	106.90	101.10
Shanxi	94.40	102.30	100.60	111.80	N.A.	N.A.	75.60	103.90	102.90
Inner Mongolia	88.10	108.90	95.90	102.30	N.A.	N.A.	81.40	110.80	99.30
Liaoning	89.80	99.80	102.70	111.00	N.A.	N.A.	76.50	105.70	102.90
Jilin	94.70	108.40	98.50	110.00	N.A.	N.A.	82.90	108.80	108.60
Heilongjiang	98.80	105.40	98.20	109.80	N.A.	N.A.	87.20	110.70	102.90
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	80.20	95.90	102.60	106.50	N.A.	N.A.	78.70	102.80	100.60
Zhejiang	85.90	99.50	99.70	101.50	N.A.	N.A.	77.90	100.80	103.00
Anhui	89.20	90.90	101.20	105.70	N.A.	N.A.	80.00	101.50	102.20
Fujian	85.10	111.60	104.00	101.80	N.A.	N.A.	83.40	100.00	106.90
Jiangxi	89.70	97.40	98.80	100.10	N.A.	N.A.	79.60	96.80	100.70
Shandong	86.50	93.20	104.40	114.40	N.A.	N.A.	75.80	107.60	104.90
Henan	87.20	87.50	105.00	115.30	N.A.	N.A.	79.90	105.20	102.30
Hubei	90.70	97.60	103.40	110.50	N.A.	N.A.	88.10	102.80	98.20
Hunan	93.00	93.20	98.20	101.30	N.A.	N.A.	84.40	98.60	111.70
Guangdong	89.90	109.00	103.90	99.40	N.A.	N.A.	85.50	92.40	100.50
Guangxi	90.20	98.80	100.80	99.40	N.A.	N.A.	80.80	91.10	105.20
Hainan	90.50	94.90	98.90	93.60	N.A.	N.A.	94.70	98.00	93.00
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	92.40	98.00	103.40	111.60	N.A.	N.A.	91.30	101.20	93.30
Guizhou	90.30	99.00	100.50	103.00	N.A.	N.A.	91.10	98.00	103.20
Yunnan	93.40	113.40	99.60	104.10	N.A.	N.A.	89.00	102.90	101.60
Tibet	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Shaanxi	87.80	105.80	100.30	108.40	N.A.	N.A.	78.60	104.40	104.80
Gansu	94.40	102.60	94.50	101.60	N.A.	N.A.	84.60	101.90	99.40
Qinghai	100.10	105.10	98.10	96.70	N.A.	N.A.	82.20	106.90	104.80
Ningxia	100.10	103.70	93.50	99.50	N.A.	N.A.	78.70	102.50	105.70
Xinjiang	106.60	96.00	109.00	95.30	N.A.	N.A.	85.40	99.10	104.60

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 1998.

Table C.27 Consumer Price indexes (CPI) for food subgroups in rural areas, 1998

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	93.30	93.40	101.20	89.30	N.A.	N.A.	101.80	95.70	98.90
Shanxi	94.00	91.50	99.30	89.50	N.A.	N.A.	103.30	98.00	100.10
Inner Mongolia	93.10	93.90	100.80	94.00	N.A.	N.A.	100.00	96.90	99.50
Liaoning	96.20	95.80	101.80	90.90	N.A.	N.A.	100.70	96.30	100.20
Jilin	98.40	91.50	104.70	94.20	N.A.	N.A.	95.00	90.70	96.80
Heilongjiang	98.60	90.80	105.80	96.30	N.A.	N.A.	91.00	93.10	101.60
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	104.60	99.90	101.30	90.20	N.A.	N.A.	105.70	95.90	98.90
Zhejiang	100.20	111.10	94.90	89.90	N.A.	N.A.	102.10	93.50	99.30
Anhui	101.20	108.50	100.20	90.30	N.A.	N.A.	99.50	96.70	97.70
Fujian	101.00	117.40	95.40	88.60	N.A.	N.A.	95.20	93.90	102.70
Jiangxi	102.00	110.40	98.00	91.80	N.A.	N.A.	100.90	88.50	99.10
Shandong	91.10	98.70	99.60	87.70	N.A.	N.A.	103.90	95.10	98.10
Henan	92.20	100.60	96.30	85.20	N.A.	N.A.	101.50	93.30	100.30
Hubei	99.70	100.50	100.50	91.10	N.A.	N.A.	98.00	94.10	98.80
Hunan	98.50	104.40	91.80	88.20	N.A.	N.A.	97.00	93.90	99.60
Guangdong	97.30	99.00	92.50	91.20	N.A.	N.A.	95.52	91.20	97.60
Guangxi	96.60	98.20	93.30	89.40	N.A.	N.A.	100.74	86.80	97.50
Hainan	94.00	102.10	93.40	92.00	N.A.	N.A.	96.70	91.10	101.30
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	92.80	96.40	98.00	87.40	N.A.	N.A.	96.00	93.40	97.10
Guizhou	94.40	101.80	99.80	96.70	N.A.	N.A.	99.30	90.70	96.30
Yunnan	95.20	97.00	99.30	99.20	N.A.	N.A.	98.60	97.00	97.20
Tibet	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Shaanxi	94.40	92.00	104.10	94.90	N.A.	N.A.	101.70	97.60	98.80
Gansu	92.60	98.60	106.40	95.10	N.A.	N.A.	102.40	97.70	97.20
Qinghai	96.40	96.50	105.90	95.40	N.A.	N.A.	99.20	98.00	101.50
Ningxia	93.90	92.40	109.00	95.30	N.A.	N.A.	102.60	96.80	98.60
Xinjiang	97.40	111.80	101.20	93.60	N.A.	N.A.	93.20	95.40	98.20

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 1999.

Table C. 28 Consumer Price indexes (CPI) for food subgroups in rural areas, 1999

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	96.30	110.30	90.80	88.80	N.A.	N.A.	91.30	88.20	99.50
Shanxi	96.00	110.10	91.00	86.10	N.A.	N.A.	88.40	86.60	97.20
Inner Mongolia	96.30	108.10	92.40	91.80	N.A.	N.A.	92.30	86.40	98.10
Liaoning	96.40	106.70	90.20	87.50	N.A.	N.A.	91.80	92.90	98.50
Jilin	94.30	108.70	91.00	89.10	N.A.	N.A.	92.60	86.40	96.80
Heilongjiang	91.60	106.60	90.30	83.40	N.A.	N.A.	91.10	84.10	96.30
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	94.80	101.20	95.00	92.00	N.A.	N.A.	91.60	90.40	99.40
Zhejiang	99.30	101.30	98.90	91.10	N.A.	N.A.	93.30	93.80	98.70
Anhui	98.70	98.20	95.40	92.90	N.A.	N.A.	92.30	89.30	94.00
Fujian	93.90	94.90	91.30	90.70	N.A.	N.A.	99.70	95.00	104.70
Jiangxi	101.10	98.60	94.60	93.10	N.A.	N.A.	90.60	99.20	95.90
Shandong	97.20	105.50	91.30	89.30	N.A.	N.A.	89.20	87.70	99.80
Henan	98.40	98.80	91.30	89.00	N.A.	N.A.	89.80	88.00	95.90
Hubei	102.90	102.10	97.10	91.40	N.A.	N.A.	96.10	89.30	95.40
Hunan	98.80	102.40	99.90	95.40	N.A.	N.A.	95.50	89.40	103.00
Guangdong	97.30	96.40	88.20	92.30	N.A.	N.A.	96.90	94.00	96.80
Guangxi	98.00	100.00	97.80	93.20	N.A.	N.A.	93.80	96.10	98.50
Hainan	93.10	95.60	94.30	94.40	N.A.	N.A.	91.30	105.50	98.30
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	93.50	105.10	95.60	90.30	N.A.	N.A.	93.50	93.90	97.10
Guizhou	97.20	107.00	96.30	90.50	N.A.	N.A.	95.10	95.80	97.50
Yunnan	98.90	110.80	96.90	96.00	N.A.	N.A.	100.90	95.20	95.70
Tibet	100.30	104.90	104.00	97.90	N.A.	N.A.	96.60	100.10	91.70
Shaanxi	100.30	111.70	93.50	87.50	N.A.	N.A.	90.40	91.50	98.70
Gansu	94.10	98.70	97.70	87.90	N.A.	N.A.	94.90	88.80	100.20
Qinghai	97.20	100.60	96.70	94.80	N.A.	N.A.	89.50	91.90	98.60
Ningxia	97.60	104.20	95.60	91.90	N.A.	N.A.	89.30	81.70	100.20
Xinjiang	94.80	86.50	92.50	89.40	N.A.	N.A.	86.20	86.70	96.60

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2000.

Table C. 29 Consumer Price indexes (CPI) for food subgroups in rural areas, 2000

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	91.10	102.30	93.00	102.30	N.A.	N.A.	84.10	104.30	99.30
Shanxi	92.30	100.50	87.60	104.10	N.A.	N.A.	83.40	105.40	99.40
Inner Mongolia	91.40	100.30	90.80	102.10	N.A.	N.A.	83.20	104.60	99.30
Liaoning	90.20	106.50	84.50	101.40	N.A.	N.A.	83.40	103.20	104.60
Jilin	90.40	105.90	79.60	96.40	N.A.	N.A.	81.40	106.20	104.20
Heilongjiang	89.10	98.90	81.30	98.10	N.A.	N.A.	81.30	105.00	99.20
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	89.70	108.10	85.40	100.90	N.A.	N.A.	87.70	98.20	98.20
Zhejiang	86.00	114.50	86.10	99.00	N.A.	N.A.	84.30	106.10	96.70
Anhui	84.90	105.30	85.90	103.80	N.A.	N.A.	85.60	102.70	97.20
Fujian	88.30	111.10	95.90	97.50	N.A.	N.A.	83.7	100.20	99.30
Jiangxi	84.50	110.80	86.20	98.60	N.A.	N.A.	85.6	97.60	94.20
Shandong	85.70	102.40	84.40	101.40	N.A.	N.A.	82.30	105.80	101.50
Henan	83.10	107.80	90.20	101.90	N.A.	N.A.	82.80	101.70	98.50
Hubei	84.60	105.50	83.50	100.60	N.A.	N.A.	89.50	99.60	99.10
Hunan	86.30	105.70	93.70	100.60	N.A.	N.A.	90.10	92.10	97.50
Guangdong	90.10	102.90	94.00	96.70	N.A.	N.A.	89.70	100.80	100.00
Guangxi	90.60	97.60	95.30	95.80	N.A.	N.A.	81.90	91.70	100.70
Hainan	90.10	107.30	94.30	97.50	N.A.	N.A.	95.70	102.80	99.80
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	85.50	97.80	84.40	98.70	N.A.	N.A.	87.60	92.10	98.50
Guizhou	92.60	102.80	83.50	97.60	N.A.	N.A.	92.40	89.10	100.00
Yunnan	90.30	100.60	89.10	93.60	N.A.	N.A.	92.00	92.60	98.80
Tibet	97.60	101.10	96.10	95.00	N.A.	N.A.	93.50	101.10	109.70
Shaanxi	89.70	104.30	80.30	100.80	N.A.	N.A.	83.70	95.70	102.60
Gansu	95.90	103.40	89.40	99.00	N.A.	N.A.	88.70	100.40	102.20
Qinghai	94.10	101.40	82.70	97.70	N.A.	N.A.	84.60	100.80	99.60
Ningxia	91.40	100.60	94.00	99.10	N.A.	N.A.	84.20	107.50	97.10
Xinjiang	87.40	108.10	81.90	95.60	N.A.	N.A.	79.70	94.90	98.90

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2001.

Table C. 30 Consumer Price indexes (CPI) for food subgroups in rural areas, 2001

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	99.30	99.70	93.00	103.60	106.50	103.80	108.40	97.70	98.50
Shanxi	100.10	97.40	88.80	101.50	102.00	100.40	108.10	96.90	100.00
Inner Mongolia	99.40	97.30	95.50	101.60	104.40	96.80	96.90	103.60	100.30
Liaoning	99.70	99.80	92.30	105.70	107.60	102.50	105.50	100.50	98.80
Jilin	96.70	97.40	93.50	109.60	110.10	108.60	110.60	97.10	102.40
Heilongjiang	97.90	97.20	99.40	106.20	111.50	102.90	105.90	99.60	100.50
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	102.70	96.50	93.10	102.20	104.50	98.60	103.10	99.90	102.80
Zhejiang	102.10	94.90	93.40	101.40	101.60	102.40	106.70	94.20	99.60
Anhui	104.20	101.30	93.10	104.10	104.30	104.90	104.40	100.00	96.30
Fujian	99.00	98.10	91.70	98.40	96.00	102.70	103.50	98.30	98.70
Jiangxi	92.40	90.10	90.00	100.00	100.20	100.40	104.20	91.70	99.20
Shandong	99.80	102.40	92.30	102.60	103.50	102.90	108.30	99.10	97.70
Henan	100.30	98.50	92.20	105.40	107.40	103.30	103.50	96.60	98.30
Hubei	98.00	96.10	94.70	99.90	98.50	101.40	104.50	96.60	97.30
Hunan	96.80	94.20	91.50	99.60	99.00	104.70	110.20	97.30	97.00
Guangdong	99.30	103.10	94.10	97.30	96.50	100.30	98.80	98.80	102.20
Guangxi	96.70	102.90	86.40	97.70	95.80	100.30	103.90	97.00	99.20
Hainan	100.60	106.40	98.50	100.80	102.10	98.90	96.20	87.90	100.00
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	100.80	106.70	95.90	102.30	104.60	98.70	100.70	99.50	98.40
Guizhou	95.70	98.50	95.60	97.40	102.40	95.80	96.80	104.00	100.10
Yunnan	103.60	100.80	93.00	96.90	96.90	93.60	98.60	101.00	99.00
Tibet	100.90	99.00	97.50	103.50	105.30	96.20	99.40	104.10	100.10
Shaanxi	97.00	95.10	92.70	100.70	104.40	97.30	104.90	99.00	99.10
Gansu	99.40	100.30	99.10	104.60	110.40	101.90	100.00	96.90	97.20
Qinghai	97.80	95.30	98.10	111.70	117.00	104.40	98.70	96.80	100.10
Ningxia	102.50	94.90	93.30	107.00	108.00	103.00	101.90	95.80	98.60
Xinjiang	107.6	112.60	95.80	114.30	120.80	102.40	110.00	101.90	102.50

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2002.

Table C.31 Consumer Price indexes (CPI) for food subgroups in rural areas, 2002

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	98.40	97.60	96.20	97.50	95.50	99.10	101.40	95.70	99.60
Shanxi	98.70	96.00	99.80	99.20	96.90	103.00	99.20	93.70	98.90
Inner Mongolia	100.00	94.80	98.40	99.50	100.40	99.50	101.80	96.30	102.70
Liaoning	96.70	89.90	103.70	99.20	98.90	102.40	102.80	97.60	99.70
Jilin	93.80	95.50	103.90	105.00	105.50	104.10	101.20	86.40	108.10
Heilongjiang	96.70	95.10	106.10	99.20	100.10	101.50	97.70	95.80	100.60
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	96.90	111.80	100.30	98.30	97.00	101.10	101.20	93.30	98.80
Zhejiang	97.50	111.50	99.10	99.70	98.60	101.60	103.90	95.70	97.80
Anhui	100.10	105.20	100.60	96.50	95.30	101.40	106.20	97.60	95.70
Fujian	101.00	114.60	97.00	99.70	97.50	104.10	104.20	95.90	99.00
Jiangxi	98.20	105.30	96.30	98.40	97.20	102.00	103.50	92.10	99.30
Shandong	98.80	100.90	100.20	100.80	100.60	103.30	102.20	95.70	97.60
Henan	100.40	103.70	95.50	98.20	95.40	99.80	103.20	96.70	98.60
Hubei	99.70	105.50	97.60	101.50	98.20	106.10	104.50	98.60	101.30
Hunan	99.80	97.20	91.40	102.60	102.00	105.50	108.50	94.50	101.10
Guangdong	99.20	88.80	96.80	99.20	98.00	102.30	103.40	96.30	99.90
Guangxi	101.60	95.00	100.80	101.30	103.00	99.40	108.20	99.00	96.10
Hainan	99.10	95.30	93.90	98.40	97.30	100.80	98.40	96.10	99.70
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	104.00	84.00	102.40	102.30	104.10	97.70	103.20	98.90	99.00
Guizhou	97.20	101.90	99.50	101.60	104.20	101.70	106.70	97.70	98.20
Yunnan	97.70	94.20	101.70	105.80	109.30	100.40	101.20	103.10	98.20
Tibet	96.20	100.00	98.90	103.50	106.20	96.60	94.50	88.70	98.80
Shaanxi	99.60	102.60	97.50	99.90	99.60	98.50	99.60	95.20	98.80
Gansu	97.50	95.40	97.10	100.30	99.50	100.20	101.10	95.10	98.70
Qinghai	97.90	99.80	95.80	104.80	106.70	103.50	96.90	97.10	98.90
Ningxia	97.70	98.10	100.40	100.60	100.40	101.50	101.20	92.40	99.40
Xinjiang	99.90	86.50	99.00	100.80	101.10	99.50	95.60	99.70	99.30

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2003.

Table C.32 Consumer Price indexes (CPI) for food subgroups in rural areas, 2003

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	102.30	113.60	117.30	105.10	108.10	99.90	99.50	98.10	100.10
Shanxi	102.40	117.90	111.60	108.30	112.30	100.00	98.70	97.20	102.20
Inner Mongolia	100.10	121.20	103.70	103.00	105.10	102.00	96.90	97.70	99.10
Liaoning	100.00	126.20	132.10	105.60	108.00	97.50	95.20	102.30	99.00
Jilin	97.00	162.00	114.50	102.30	103.50	101.00	92.80	104.00	100.00
Heilongjiang	97.90	115.90	110.90	101.00	104.50	99.80	96.70	100.40	99.30
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	101.20	111.80	114.00	104.00	105.50	103.90	97.30	98.60	100.70
Zhejiang	103.10	107.60	113.80	105.70	107.60	101.60	97.40	100.10	101.50
Anhui	101.50	129.30	118.50	109.10	111.70	99.30	100.80	100.50	100.90
Fujian	106.10	102.80	110.10	101.80	104.10	100.00	97.90	100.50	99.40
Jiangxi	104.00	105.80	114.90	103.30	107.30	98.40	100.50	97.90	98.50
Shandong	104.80	128.00	112.10	106.30	108.80	104.10	99.00	102.30	99.50
Henan	106.20	119.60	121.10	105.50	106.70	104.40	98.60	97.90	99.90
Hubei	105.30	112.40	114.50	104.20	107.60	99.80	99.50	97.20	100.30
Hunan	105.00	115.30	115.40	113.60	117.50	105.50	102.00	100.10	102.50
Guangdong	102.50	105.30	112.80	101.20	101.70	100.80	101.90	99.40	100.50
Guangxi	111.90	109.40	117.20	102.60	103.90	102.40	102.00	97.00	104.20
Hainan	109.50	107.30	104.20	105.40	106.90	109.00	99.30	101.10	98.00
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	101.90	116.90	104.40	100.00	100.30	99.80	102.00	95.00	99.90
Guizhou	102.90	98.70	107.70	101.00	102.70	96.60	97.30	100.50	103.20
Yunnan	102.50	105.50	108.00	99.70	99.50	101.40	95.50	101.00	98.00
Tibet	98.30	98.00	97.90	108.70	111.00	104.50	99.70	99.40	92.30
Shaanxi	105.00	123.50	107.70	103.50	108.20	100.00	97.40	102.90	100.30
Gansu	102.20	106.20	103.60	102.60	103.70	103.00	100.90	97.20	99.10
Qinghai	100.80	110.96	109.50	102.80	103.80	99.90	98.90	97.30	99.70
Ningxia	100.80	129.20	102.90	102.00	102.50	99.30	97.10	97.10	97.60
Xinjiang	91.10	102.20	115.70	98.10	97.30	99.60	100.00	89.90	99.30

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2004.

Table C. 33 Consumer Price indexes (CPI) for food subgroups in rural areas, 2004

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	124.20	95.70	126.10	115.20	119.60	109.60	126.00	112.10	103.10
Shanxi	123.70	89.60	111.80	119.60	124.60	117.70	125.40	122.30	101.40
Inner Mongolia	123.10	95.80	113.90	113.90	115.90	115.30	123.40	122.20	101.10
Liaoning	128.10	92.00	115.90	117.80	119.30	117.10	120.10	115.80	102.60
Jilin	140.60	94.80	110.10	112.70	113.30	115.20	120.10	116.80	101.80
Heilongjiang	131.80	95.90	112.30	110.40	116.00	110.40	111.30	113.50	104.30
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	136.50	88.50	113.10	115.70	120.50	111.50	120.80	115.50	100.40
Zhejiang	138.30	97.50	121.00	119.90	124.70	116.20	123.60	114.20	101.30
Anhui	137.30	83.20	124.10	118.50	120.20	113.40	116.60	122.30	96.20
Fujian	127.10	99.30	118.10	112.90	118.90	111.30	124.60	108.40	99.50
Jiangxi	126.90	97.10	124.00	115.10	119.50	109.20	111.00	120.30	98.30
Shandong	126.60	86.20	124.20	116.00	117.70	117.20	121.20	120.10	102.20
Henan	127.60	101.90	122.80	119.00	123.90	114.80	116.50	117.70	107.30
Hubei	132.30	94.50	123.40	114.20	118.10	113.50	118.90	125.00	101.90
Hunan	129.10	99.60	131.00	121.20	123.90	116.00	119.40	129.70	100.70
Guangdong	121.30	102.80	117.90	113.10	117.10	107.50	112.30	110.50	102.00
Guangxi	119.70	98.70	129.00	118.70	121.70	118.80	121.90	114.20	99.90
Hainan	114.70	98.30	111.30	129.30	139.10	104.00	111.20	108.40	104.70
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	123.60	102.30	125.00	120.70	126.40	118.00	113.70	120.50	100.60
Guizhou	123.90	109.10	128.90	115.90	121.60	119.40	115.10	113.40	110.80
Yunnan	125.00	122.60	122.10	118.50	124.10	109.50	113.60	99.40	99.10
Tibet	113.40	100.60	111.80	118.10	122.80	106.80	107.70	102.90	103.00
Shaanxi	122.40	88.60	111.00	115.50	126.50	113.50	118.20	119.10	101.20
Gansu	119.50	99.60	110.60	110.00	119.30	105.80	102.80	114.30	105.20
Qinghai	115.70	96.80	115.40	113.40	113.90	117.10	114.30	104.60	104.20
Ningxia	122.70	90.10	116.30	119.20	118.30	125.70	129.00	127.10	106.10
Xinjiang	118.80	118.50	107.80	109.70	109.30	112.00	115.10	112.20	98.80

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2005.

Table C. 34 Consumer Price indexes (CPI) for food subgroups in rural areas, 2005

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	103.00	94.40	96.60	103.00	101.40	107.60	103.30	99.30	102.20
Shanxi	103.10	101.30	93.60	101.40	97.90	107.10	103.10	104.90	100.90
Inner Mongolia	104.50	103.70	97.50	101.80	100.40	102.00	103.50	99.30	99.40
Liaoning	102.60	104.90	86.90	100.40	98.30	106.60	102.60	106.60	101.80
Jilin	104.00	93.10	92.50	103.10	101.70	108.30	102.90	94.10	100.90
Heilongjiang	102.60	103.30	96.90	101.60	99.20	97.60	106.00	98.90	101.90
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	100.70	113.50	93.10	104.70	102.90	110.40	105.70	107.00	100.70
Zhejiang	98.40	108.30	96.10	102.70	99.40	108.00	107.10	105.70	100.70
Anhui	96.70	112.40	90.40	108.00	107.60	111.60	109.90	103.50	102.10
Fujian	99.60	111.50	96.20	105.30	101.80	114.90	103.80	105.10	99.40
Jiangxi	98.80	118.30	97.80	103.80	102.00	107.00	107.40	100.70	100.00
Shandong	100.00	121.30	93.00	100.40	98.40	104.30	104.60	102.60	107.00
Henan	101.30	109.40	90.90	102.40	101.10	103.50	105.20	101.00	104.80
Hubei	101.50	109.40	91.00	106.40	103.10	110.50	108.70	103.00	105.40
Hunan	102.10	107.50	96.00	100.30	96.40	114.00	110.90	109.00	100.70
Guangdong	101.10	110.70	100.30	106.00	103.80	111.20	104.00	110.70	99.70
Guangxi	100.80	105.80	92.70	103.90	100.90	107.30	102.50	105.80	104.30
Hainan	100.30	116.10	94.70	100.90	94.70	116.90	104.80	106.10	100.00
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	101.80	100.70	94.10	101.10	98.40	106.60	106.80	104.10	99.50
Guizhou	100.60	96.60	85.00	105.10	101.10	105.50	106.00	100.50	111.00
Yunnan	102.70	84.70	98.30	98.90	96.00	103.80	107.60	109.90	101.20
Tibet	102.90	96.80	101.10	102.90	103.30	99.00	108.50	101.30	108.90
Shaanxi	102.20	98.90	98.40	102.10	100.40	101.70	104.40	102.00	102.40
Gansu	103.20	98.00	97.90	102.30	99.50	102.70	107.10	107.70	100.90
Qinghai	102.20	98.20	92.60	100.60	100.00	98.10	105.10	104.30	106.90
Ningxia	105.70	98.70	97.20	100.90	100.50	102.40	104.30	95.90	102.90
Xinjiang	103.40	90.00	93.10	97.30	95.10	103.60	100.40	106.80	99.00

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2006.

Table C.35 Consumer Price indexes (CPI) for food subgroups in rural areas, 2006

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	103.30	110.70	97.80	96.50	95.50	98.60	94.30	101.00	100.60
Shanxi	101.30	110.70	100.00	95.40	93.20	92.90	92.70	97.60	100.00
Inner Mongolia	102.40	112.70	96.80	97.80	96.20	96.00	94.90	99.40	100.90
Liaoning	103.00	109.90	98.40	96.00	95.60	93.10	93.80	100.20	100.80
Jilin	105.00	112.30	102.20	93.50	92.30	94.70	93.70	94.10	100.90
Heilongjiang	104.00	114.60	99.60	96.30	94.20	98.60	97.30	100.30	98.10
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	103.10	108.80	97.50	96.10	95.60	93.30	96.80	104.30	101.40
Zhejiang	103.00	105.60	99.30	95.40	94.10	95.70	95.10	100.50	100.10
Anhui	103.40	104.30	98.00	95.60	94.20	96.80	97.20	96.90	101.30
Fujian	103.70	107.00	99.20	98.30	97.40	100.90	96.90	104.00	101.00
Jiangxi	101.30	109.70	97.40	94.50	94.70	93.00	99.70	95.60	100.50
Shandong	103.30	107.50	99.00	95.10	93.80	95.80	95.70	102.00	100.60
Henan	101.80	110.90	99.80	95.90	93.50	100.80	96.90	100.70	100.40
Hubei	103.50	107.50	96.40	98.70	99.30	95.50	94.00	94.80	101.80
Hunan	102.30	111.40	94.30	97.20	96.40	96.50	98.10	94.30	100.50
Guangdong	103.10	106.90	101.80	97.60	98.60	94.10	95.60	100.90	100.70
Guangxi	100.60	109.00	102.60	93.60	95.60	86.20	96.60	99.90	106.40
Hainan	105.00	98.30	99.70	99.30	99.70	100.00	101.40	106.20	99.70
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	101.80	111.20	95.90	100.80	99.70	102.40	99.90	98.80	100.00
Guizhou	100.90	116.00	95.20	101.50	100.10	101.20	96.90	100.70	100.30
Yunnan	101.50	105.70	98.20	100.30	98.90	101.90	99.90	99.10	99.80
Tibet	102.40	110.20	99.20	109.50	113.30	102.30	101.80	100.20	100.80
Shaanxi	103.40	109.50	97.80	101.80	103.20	100.10	95.40	98.00	101.50
Gansu	102.50	110.90	99.80	98.10	94.40	98.10	88.90	99.60	101.00
Qinghai	103.40	116.10	94.30	95.80	95.90	91.40	94.50	95.10	98.90
Ningxia	100.20	116.50	98.80	97.40	97.10	99.00	90.20	100.80	100.50
Xinjiang	102.80	107.30	98.40	98.20	96.20	105.20	93.90	98.10	99.10

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2007.

Table C.36 Consumer Price indexes (CPI) for food subgroups in rural areas, 2007

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	109.90	111.70	124.10	132.90	141.70	127.70	122.30	106.50	101.40
Shanxi	106.60	111.10	121.50	136.00	149.30	118.40	126.90	104.70	102.00
Inner Mongolia	105.70	106.70	128.10	134.00	143.50	120.50	121.90	104.50	99.40
Liaoning	106.60	111.50	132.80	141.30	147.90	133.90	127.30	104.70	101.60
Jilin	104.40	103.00	124.50	145.80	155.10	129.70	121.10	110.20	101.70
Heilongjiang	103.80	98.10	142.50	135.10	149.40	122.40	121.80	107.10	101.30
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	101.80	117.80	131.50	129.30	135.60	123.70	121.00	107.70	104.60
Zhejiang	103.70	105.60	132.50	132.80	141.60	123.90	125.30	104.70	103.10
Anhui	107.80	107.10	128.20	129.70	135.40	124.30	120.00	105.90	100.20
Fujian	106.50	112.10	123.20	127.20	130.50	125.70	122.10	108.70	100.70
Jiangxi	110.30	106.20	124.50	125.00	132.10	119.10	115.00	104.20	101.70
Shandong	107.30	113.70	123.50	137.00	147.00	126.00	122.30	103.80	103.80
Henan	108.20	110.40	127.30	139.40	147.60	123.20	117.50	109.40	102.30
Hubei	108.60	107.80	133.20	129.30	135.10	128.80	121.40	108.30	102.20
Hunan	109.60	118.20	130.80	136.00	143.60	121.00	121.50	109.50	100.10
Guangdong	106.40	106.70	126.10	122.20	125.80	117.30	116.70	105.20	100.20
Guangxi	104.20	104.80	122.90	134.90	138.00	133.20	125.30	105.80	102.70
Hainan	103.10	111.80	111.50	124.20	129.90	119.40	112.10	106.70	102.20
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	108.30	112.90	127.90	131.30	141.80	121.00	116.20	106.80	99.60
Guizhou	106.70	113.50	155.30	126.50	138.80	125.00	115.90	112.90	102.30
Yunnan	105.30	115.20	125.90	130.00	137.90	118.10	111.70	108.00	102.60
Tibet	104.10	103.80	112.40	119.70	126.10	108.70	107.00	104.20	102.30
Shaanxi	107.10	111.20	121.50	130.10	151.80	129.00	120.90	108.60	104.20
Gansu	108.20	103.20	125.70	133.60	143.40	132.70	125.90	109.40	103.90
Qinghai	108.60	102.20	124.90	141.00	141.50	135.70	115.70	103.00	108.40
Ningxia	106.60	101.70	127.70	141.90	147.20	123.60	132.00	109.80	102.80
Xinjiang	108.10	99.20	133.40	127.30	129.80	121.50	123.50	110.90	107.60

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2008.

Table C. 37 Consumer Price indexes (CPI) for food subgroups in rural areas, 2008

(the preceding year =100)

Region	Grain	Vegetables	Edible oil	Meat & Poultry	Meat	Poultry	Eggs	Aquatic	Dairy
Beijing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Tianjin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Hebei	106.80	108.50	129.40	122.10	125.30	116.10	107.00	117.70	117.40
Shanxi	108.60	114.00	129.50	124.40	125.10	115.50	99.70	117.80	123.30
Inner Mongolia	107.00	112.20	133.60	124.00	127.20	106.30	100.50	113.50	115.80
Liaoning	104.30	102.60	132.90	120.60	125.00	102.20	103.10	110.00	113.70
Jilin	101.80	98.20	118.80	124.20	126.40	114.00	106.40	111.80	111.40
Heilongjiang	107.60	112.40	131.70	119.50	121.60	114.50	103.10	111.80	122.50
Shanghai	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Jiangsu	104.20	111.10	123.20	119.30	122.90	109.10	104.50	116.20	113.30
Zhejiang	105.30	114.50	125.80	118.20	122.70	104.70	105.00	112.70	112.10
Anhui	104.50	115.80	123.30	120.40	123.50	112.10	106.10	115.60	113.90
Fujian	103.70	108.10	119.00	117.80	119.30	111.10	105.20	111.20	115.20
Jiangxi	110.40	104.00	121.60	116.90	122.30	105.50	103.70	118.10	111.10
Shandong	104.80	107.80	126.50	121.70	123.80	115.50	105.80	114.90	113.40
Henan	107.90	110.90	128.30	125.90	127.60	110.80	105.10	119.70	113.20
Hubei	108.20	110.50	128.80	121.50	127.60	108.90	104.10	125.50	113.80
Hunan	113.70	128.30	133.60	120.10	122.80	107.60	99.90	123.40	104.70
Guangdong	107.90	115.60	120.40	116.30	120.80	103.90	105.20	113.90	107.60
Guangxi	110.50	140.40	124.50	120.90	125.60	109.30	108.40	120.60	117.80
Hainan	110.90	112.80	121.80	118.90	125.10	107.60	109.10	117.40	124.90
Chongqing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sichuan	106.40	104.60	117.40	114.70	117.20	105.60	105.50	115.20	107.90
Guizhou	107.10	107.80	127.00	120.90	133.50	106.40	102.40	112.30	110.20
Yunnan	109.10	104.70	128.10	124.20	130.50	104.90	105.00	112.40	111.80
Tibet	104.40	104.40	124.70	120.80	122.80	116.50	105.20	109.10	110.50
Shaanxi	107.90	107.50	124.20	120.60	131.10	105.90	103.30	117.70	115.50
Gansu	108.00	102.10	140.90	124.90	131.20	108.20	100.60	117.10	109.60
Qinghai	112.10	124.30	130.80	125.50	123.50	140.50	104.20	118.70	121.10
Ningxia	110.80	109.90	136.20	129.80	132.20	112.50	98.60	118.50	123.40
Xinjiang	114.90	106.60	128.80	134.50	139.70	117.00	105.70	116.00	116.10

Note: N.A.: not available.

Source: China Urban Life and Price Yearbook 2009.

Appendix D Supply-demand model of feed grain

Table D. 1 Demand for feed corn and livestock products and price data, 1980-2007

Year	Demand for feed corn (tonnes)		Corn price (USD/tonne)	CPI-world (2005=100)	China's domestic livestock demand (tonnes)	
	World	China			Beef	Pork
1980	300497739	54442847	141.333	17.36	359784.07	12015596.74
1981	295333189	50229654	112.988	18.66	375506.84	12564719.80
1982	304923543	51404103	120.468	20.83	385468.30	13384014.81
1983	290415283	58317842	144.483	26.90	429662.95	13855743.99
1984	300611159	60242769	117.712	32.53	483988.71	15181738.33
1985	286639501	46763648	99.209	31.13	522704.19	17345995.54
1986	306007954	50413919	72.044	33.47	658816.13	18805330.70
1987	309845022	50337101	94.091	34.42	851929.85	19208923.51
1988	293706004	52409055	115.350	38.34	963261.06	21107630.34
1989	305035534	52325969	109.838	43.30	1064735.75	22112169.32
1990	302774537	57973510	105.114	45.55	1180803.66	23695898.23
1991	326835015	63505574	107.870	46.27	1379538.13	25380867.75
1992	338592995	67605120	96.847	49.35	1865561.95	27360490.58
1993	337365883	74502918	112.200	51.03	2304460.66	29513131.21
1994	365574584	82565461	109.445	59.56	2824306.67	32199583.35
1995	360171912	87636590	169.285	64.77	3595386.46	32918070.18
1996	376110115	88400751	120.861	70.56	3612656.55	32583817.62
1997	387755576	88203945	109.248	73.77	4475331.80	37053016.53
1998	388408227	87712131	92.680	78.48	4873205.88	39899187.26
1999	400568107	92813948	87.825	80.75	5181368.16	40091720.64
2000	405950591	93931080	88.874	84.06	5251935.94	41047127.16
2001	417516397	92212315	92.516	87.11	5187642.59	41779926.34
2002	416624244	94079468	106.262	89.46	5347684.14	42454567.10
2003	426308156	95002228	115.908	92.97	5567903.71	43510326.05
2004	449164284	96852820	97.437	95.93	5712419.46	44299386.48
2005	453475613	99469911	105.803	100.00	5771592.19	46403824.15
2006	437112881	97572331	158.590	104.48	5858609.03	47328658.83
2007	463053345	100332225	217.872	109.71	6236053.70	44017055.04

Source: FAOSTAT, OECD database, World data bank (the World Bank).

Table D.2 Corn production and calculation of production share for eight countries (regions)

	Countries	2007	2008	2009	Price Elasticity[1)]
Production	China	152418870	166032097	164107560	0.1710
	U.S.	331175000	307142000	333011000	0.1768
	Argentina	21755400	22016900	13121400	0.6273
	Brazil	52112200	58933300	51232400	0.4009
	South Africa	7125000	12700000	12050000	0.0350
	Mexico	23512800	24320100	20142800	0.3030
	Canada	11648700	10592000	9561200	0.1300
	European Union (Total)	48873306	62906452	57779546	0.2003
	Others	141019849	162075494	157817528	0.2300
	World (Total)	789641125	826718343	818823434	0.2139
	Countries	**2007**	**2008**	**2009**	**Average share**
Share	China	19.302	20.083	20.042	19.809
	U.S.	41.940	37.152	40.669	39.920
	Argentina	2.755	2.663	1.602	2.340
	Brazil	6.599	7.129	6.257	6.662
	South Africa	0.902	1.536	1.472	1.303
	Mexico	2.978	2.942	2.460	2.793
	Canada	1.475	1.281	1.168	1.308
	European Union + (Total)	6.189	7.609	7.056	6.952
	Others	17.859	19.605	19.274	18.912

Note: 1) The price elasticities listed here, excluding the world one, are the estimation results in Koizumi (2007).

Source: FAOSTAT, Koizumi (2007).

Table D.3 GDP and economic growth rates for the world and China

Year	Gross domestic product (current prices, USD, billions)		Economic growth (percent change, constant prices)	
	World	China	World	China
1980	10669.196	202.458	1.847	7.910
1981	10901.250	168.367	2.242	5.200
1982	10789.235	281.280	0.708	9.100
1983	11075.960	301.803	2.819	10.900
1984	11506.707	310.686	4.898	15.200
1985	11926.168	307.017	3.944	13.500
1986	14050.564	297.590	3.464	8.800
1987	16130.208	323.973	3.749	11.600
1988	18097.799	404.149	4.476	11.300
1989	19019.813	451.311	3.843	4.100
1990	22137.595	390.279	3.193	3.795
1991	23733.447	409.165	2.208	9.210
1992	24271.248	488.222	2.214	14.195
1993	24863.391	613.223	2.078	14.003
1994	26699.799	559.224	3.375	13.099
1995	29671.311	727.947	3.262	10.900
1996	30399.509	856.084	3.743	10.000
1997	30265.147	952.649	4.240	9.300
1998	30041.456	1019.480	2.558	7.801
1999	31196.002	1083.280	3.501	7.599
2000	32148.602	1198.480	4.774	8.399
2001	31940.900	1324.810	2.288	8.292
2002	33243.898	1453.830	2.892	9.101
2003	37375.771	1640.960	3.623	10.101
2004	42071.098	1931.650	4.933	10.091
2005	45514.869	2256.920	4.551	11.290
2006	49295.439	2712.920	5.206	12.692
2007	55615.474	3494.240	5.339	14.191
2008	61187.163	4519.950	2.834	9.595
2009	57843.376	4984.730	-0.577	9.096

Source: International Monetary Fund, World Economic Outlook Database 2011.

Table D.4 Projections on China's population by the UN, 2010-2050

Year	Population (1,000 persons)				Period	Average Growth Rate (%)			
	Low Variant	Medium Variant	High Variant	Constant Fertility		Low Variant	Medium Variant	High Variant	Constant Fertility
2010	1341335	1341335	1341335	1341335					
2015	1357041	1369743	1382444	1373992	2010-2015	0.23	0.42	0.6	0.48
2020	1355822	1387792	1419761	1398165	2015-2020	-0.02	0.26	0.53	0.35
2025	1341278	1395256	1449235	1409204	2020-2025	-0.22	0.11	0.41	0.16
2030	1318826	1393076	1467433	1407092	2025-2030	-0.34	-0.03	0.25	-0.03
2035	1287169	1381588	1477331	1394450	2030-2035	-0.49	-0.17	0.13	-0.18
2040	1244685	1360906	1481942	1373103	2035-2040	-0.67	-0.3	0.06	-0.31
2045	1191720	1331768	1482486	1342858	2040-2045	-0.87	-0.43	0.01	-0.45
2050	1130211	1295604	1479310	1303424	2045-2050	-1.06	-0.55	-0.04	-0.6

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm.