

Changing Food Consumption Pattern and its Impacts on Agriculture in Mainland China

Wen S. Chern

Visiting Research Fellow, Institute of Economics, Academia, Sinica
Professor, Department of Agricultural Economics, The Ohio State University

Abstract

This paper compares the historical trends of food consumption pattern between rural and urban households in Mainland China, discusses the impacts of rationing on the estimation of food demand elasticities, and presents the estimated elasticities and their implications. Using the data from the post - rationing period, the estimated expenditure elasticity of grain is 0.15 for urban households. The study shows that the income and price effects are very strong for non-staple foods. Since many non-staple foods have a price-elastic demand, it is appropriate to suggest that, in order to raise farm income, the Chinese government needs to invest in agricultural research and development for reducing the costs of production and marketing, and thus, the food prices. The positive expenditure elasticity for grain and the high expenditure elasticities for meat and poultry imply that Mainland China will face increasing demand for both food grain and feed grain in the future.

Key words : data, elasticity, urban, rural, grain, comparison

Introduction

One of the important phenomena in a market economy is that the prices of consumer goods are determined by market forces. Thus in a market economy, the success of economic development is measured by the extent of consumer satisfaction and the profit or income to the producer. Very often, policy makers tend to focus on increasing productivity or yield in agricultural production as a strategy for economic development. However, increasing production does not always bring a higher revenue to the producer because revenue depends upon the price which is influenced by market demand. Market demand is determined by the preferences of households or consumers.

Therefore, in a market economy, consumers play a decisive role in the marketplace. Consumers determine the market demand for consumer goods such as food and the commodity price is determined by demand and supply rather than by government control as in the centrally planned economy. Since Mainland China began its economic and agricultural reforms in 1978, Chinese consumers have revealed many notable changes in their food consumption pattern, ranging from the increased food consumption in general to the specific shifts from grain and other staple foods to meats, poultry, and specialty foods. Increasing the demand for food and changing the demands for various foods have had profound impacts on the market prices of food, farm income, as well as the imports and exports of

agricultural and food products in Mainland China.

The Chinese government eliminated food rationing as a subsidy to urban households in May, 1993. This policy action symbolized an important step in developing a true market system for the agricultural sector in Mainland China. The removal of food rationing means that households, as consumers, will not face quantity restriction while purchasing grain and edible oil in the marketplace. Furthermore, the Chinese government also removed the price subsidies for these previously rationed food commodities. Therefore, the prices of grain and other commodities previously under rationing are now being determined by the market forces of demand and supply. In such a market economy, consumer demand will affect farmers' relative profitability in producing various agricultural products in Mainland China.

Recent surges in food prices after the removal of food rationing in 1993 reflected free market adjustments in which consumer demand was permitted to take its full impact on market equilibrium conditions. In the short run, these increases in food prices would have varying effects on both consumers and producers. However, consumers and producers would be responsive to changes in food prices. In the long run, the foods in high demand are likely to sustain high prices while those in low demand would suffer from low prices. Of course, the government may invoke policies which would affect the prices of food, and thus, alter the market equilibrium condition.

It is, therefore, important to understand the factors affecting food demand in Mainland China. The objectives of this paper are to analyze the recent important changes in Chinese food consumption pattern, to present the estimated food demand elasticities of urban households and to discuss the implications of these estimates for agricultural

production, farm income, and agricultural trade in the future.

Urban households are important for the agricultural sector in Mainland China because they are the major consumers of agricultural commodities in the domestic market. Most of rural households tend to be self-sufficient in many of the food items they consume. Thus, urban households will likely to provide a key economic force in determining what are the most profitable food commodities to produce. It is, therefore, particularly important to understand the consumption behavior of Chinese urban households.

Food Consumption Patterns in Mainland China

Table 1 shows the per capita consumption trends of major foods consumed by urban households in Mainland China during 1985-1995. These data were obtained from the urban household survey conducted by the State Statistical Bureau (SSB). There has been a declining trend in the consumption of grain, vegetables and sugar during the whole period but an increasing trend for all other major food items, especially meats and poultry until 1991 or 1992, if not the whole period. Per capita consumption of several meats actually declined during 1993 - 1995, perhaps as a result of the consumer response to the dramatic increases in meat prices. For comparison, Table 2 presents the consumption data for rural households. The increasing trends are very notable for edible oil, meats, poultry, eggs, and sugar during 1985 - 1992. Interestingly, per capita consumption of meats and sugar declined during 1993 - 1995. The recent stagnation in the consumption of several non-staple foods particularly meats has caused heated debates in

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Table 1. Annual Per Capita Food Consumption by Urban Households^a

Item	1985	1988	1989	1990	1991	1992	1993	1994	1995
Grain	134.76	137.17	133.94	130.72	127.93	111.50	97.78	101.67	97.00
Edible Oil	5.76	6.69	6.16	6.40	6.93	6.65	7.14	7.53	7.11
Vegetables	144.36	147.02	144.56	138.70	132.18	124.91	120.64	120.74	116.47
Pork	16.68	16.94	17.53	18.46	18.86	17.70	17.40	17.12	17.24
Beef & Mutton	2.04	2.81	2.73	3.28	3.34	3.71	3.36	3.10	2.44
Poultry	3.24	4.00	3.65	3.42	4.40	5.08	3.70	4.13	3.97
Eggs	6.84	6.87	7.05	7.25	8.26	9.45	8.86	9.68	9.74
Fish & Shrimp	7.08	7.07	7.61	7.69	8.02	8.19	8.02	8.53	9.20
Sugar	2.52	2.58	2.38	2.14	1.80	1.85	1.77	1.91	1.68

^a Consumption refers to the purchased quantity in the urban household survey.

Sources : State Statistical Bureau, Statistical Yearbook of China, 1993 and 1996.

Table 2. Annual Per Capita Food Consumption by Rural Households

Item	1978	1980	1985	1988	1989	1990	1991	1992	1993	1994	1995
Grain	247.83	257.66	257.45	260.00	262.00	262.08	255.58	250.50	266.02	260.56	258.92
Edible Oil	1.97	2.49	4.04	4.76	4.81	5.17	5.65	5.85	5.66	5.66	5.80
Vegetables	141.50	127.21	131.13	130.00	133.00	134.00	126.97	129.12	107.43	107.86	104.62
Meats ^a	5.76	7.75	10.97	10.71	11.00	11.34	12.15	11.83	11.68	11.00	11.29
Poultry	0.25	0.66	1.03	1.25	1.28	1.26	1.34	1.49	1.62	1.63	1.83
Eggs ^b	0.80	1.20	2.05	2.28	2.41	2.41	2.73	2.85	2.88	3.03	3.22
Fish & Shrimp	0.84	1.20	1.64	1.91	2.14	2.13	2.21	2.25	2.47	2.68	3.06
Sugar	0.73	1.06	1.46	1.41	1.50	1.50	1.40	1.54	1.43	1.34	1.28

^a Meats include pork, beef and mutton.

^b Includes egg related products.

Sources : State Statistical Bureau, Statistical Year Book of China, 1993 and 1996.

Mainland China about the accuracy of the survey data and the commonly projected increases in future meat consumption resulting from the expected increases in household income.

Comparing with urban households, Chinese rural households consumed much less meats, poultry and fish but much more grain and about the same amount of vegetables. As income increases for rural households, they are likely to follow urban households to consume less grain and more meat and poultry. However, whether or not these trends can be extended into the future depends upon the consumer

demand responsiveness (measured by elasticities) to changes in income and prices and future levels of household income and food prices. While one can be relatively certain that Chinese household income will increase in the future, the food prices will critically depend upon the cost of production, domestic production, export demand and import supply.

Consider first the income effect on food consumption. It is noted that the Engel coefficients (i.e., the proportion of income spent on food) remained very high during the period under economic reforms. In 1990, the per capita living

expenditure by urban households was 1,401.75 yuan in which 55% was devoted to food including alcoholic and tobacco products (SSB, 1990). This Engel coefficient was about 56% in 1981, declined to 50% in 1993, and remained at this level during 1994 - 1995 (SSB, 1994 - 1996). These aggregate indicators suggest that Chinese urban households continued to spend more than half of their income for food. Notice that these food expenditures did not include the foods urban households received as gifts or in-kind compensation from their working units. In 1990, the food received as subsidized income amounted to 35.67 yuan per person (SSB, 1990). If this subsidized income in food is added to the food expenditure, the Engel coefficient would have been 56%. It may not be transparent why Chinese households spent so much in food. One explanation is that, as household income increased under economic reforms, Chinese apparently began to improve their standard of living by consuming more and better foods. The concentration of spending on

food can also be attributed to the lagged responses and other restrictions in the market. First, it took longer for the Chinese economy to produce and supply other consumer goods, especially the consumer durables, than agricultural commodities. Secondly, housing has been under rationing. Therefore, most households could not buy and own their houses and thus have to forgo many direct and induced housing expenditures. These forces have kept the Engel coefficients from declining in Mainland China.

Next, consider the price effect on food consumption. Table 3 shows the rates of increases in consumer good prices during 1988 - 1995. The overall consumer prices at the retail level can be used as a measure of inflation. The inflation rates in Mainland China were in double-digit (higher than 10%) in 1988 - 1989 and relatively low during 1990 - 1992 but surged to 13.2% in 1993. The inflation rates in 1994 and 1995 were 21.7% and 14.8%, respectively. It is noted that after the dramatic

Table 3. Rates of Increases in Consumer Good Prices

Items	Rate of Increase (%) from Previous Year							
	1988	1989	1990	1991	1992	1993	1994	1995
Consumer (Retail) Prices								
All Items	18.5	17.8	2.1	2.9	5.4	13.2	21.7	14.8
Food	23.0	16.2	0.3	3.3	7.7	14.3	35.2	24.7
Grain	14.1	21.3	-4.8	8.6	24.3	27.7	48.7	34.4
Non - staple Food	30.4	14.3	1.3	2.4	-5.2	14.4	a	
Clothing	12.7	18.1	7.1	4.1	2.8	6.2	19.6	16.8
Free Market Prices								
Grain	24.2	36.6	-18.6	-13.6	-0.3	16.0		40.5
Vegetable Oil	18.5	35.4	-4.8	-4.8	-6.1	14.3		
Vegetables	30.1	-0.2	-4.8	2.3	4.0	8.6		19.7
Meats, Poultry & Eggs	36.7	13.7	-4.1	-5.0	2.9	13.8		22.6
Fish & Shrimp	27.9	11.7	-4.6	1.1	3.7	17.9		
Fruits	22.2	1.1	-7.8	4.0	-3.6	8.1		

* Blanks indicate data not available.

Sources : State Statistical Bureau, *Statistical Yearbook of China*, 1993 and 1996.

State Statistical Bureau, *Almanac of China Economy*, 1989 to 1994.

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increases in most food prices in 1988 - 1989, the overall food prices remained relatively stable for two years (1990 - 1991) and then started to climb in 1992 and remained very high in 1994-1995. Since Chinese urban households spent more than 50% of their income (budget) for food, there was a very high correlation between food prices and the overall inflation rate. In free markets, the prices of major foods such as grain, vegetable oil, meats, poultry and eggs declined for two consecutive years in 1990 and 1991. However, after 1992, all food prices surged substantially.

It is difficult to visualize any apparent relationship between the movement of these national aggregate prices presented in Table 3 and the per capita consumption data presented in Tables 1 and 2. This is because the consumption (or demand) of foods is affected by not just prices but income and other factors. Furthermore, a change in the price of a food affects not only the demand for this food but also the demand for other foods due to substitution effects. It is noted that the recent declines in the consumption of grain, edible oil, vegetables and pork by urban households and of grain, edible oil and meats by rural households may be attributed to the surges of their prices. However, it would require a demand model to assess the consumer responsiveness to changes in food prices as to be discussed later.

Regional Food Consumption Patterns by Urban Households

In analyzing the provincial - level food consumption data during 1985 - 1995, we observe several interesting trends. First, grain consumption has been gradually decreasing in all areas. Table 4 shows per capita grain consumption of urban households by area during 1985 - 1995. Six cities and provinces are selected to illustrate this relatively stable trend in grain consumption. Beijing and Shanghai are high income areas. Anhui and Henan represent low income regions while Sichuan and Shanxi are in the middle. In 1985, the differences in per capita grain consumption among provinces and cities were very small. These small differences may be attributed to the effects of grain rationing. Over time, the grain consumption changed somewhat as it appeared to decline steadily in Beijing and Shanghai while in other middle and low income regions, it continued to increase through 1989 and then showed a decrease in 1990 in all four provinces. In 1991, grain consumption increased in Anhui and Shanxi. By 1991, the per capita grain consumption in Beijing was only about 61% of the consumption level in Shanxi.

During 1985 - 1991, grain was still under rationing and grain prices increased only moderately. Specifically, the average price per kilogram of grain

Table 4. Trend of Per Capita Grain Consumption by Area

City / Province	Kilograms per capita per year										
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Beijing	130.92	124.08	123.48	111.36	104.16	103.56	90.12	73.68	71.53	73.18	79.61
Shanghai	132.36	133.20	124.44	117.24	114.36	108.36	101.52	78.28	82.39	78.94	82.12
Anhui	128.88	132.72	130.20	135.24	136.68	131.40	132.00	115.98	117.15	116.13	110.82
Henan	129.24	146.52	144.12	142.08	143.40	141.96	132.84	130.30	117.63	119.50	118.12
Sichuan	122.28	122.76	119.76	134.64	141.96	132.60	126.96	105.38	95.13	95.78	89.20
Shanxi	135.00	147.72	146.04	144.36	148.32	145.92	147.24	142.18	114.00	140.77	122.49

Sources : State Statistical Bureau, Income and Expenditure Survey of Chinese Urban Households, 1985 - 1995.

was 0.46 yuan in 1985, 0.49 in 1986, 0.52 in 1987, 0.57 in 1988, 0.65 in 1989, 0.69 in 1990, and 0.86 in 1991 (SSB, 1991). The price increase in 1991 was caused solely by the drastic increase in the price of grain purchased from food services such as restaurants. Under grain rationing, the rising income would not have much impact on grain consumption by Chinese urban households in most areas of the country except in the very high income cities such as Beijing and Shanghai. During the post - rationing period of 1993 - 1995, grain consumption was subject to more fluctuations than in the previous period, apparently due to the diverging economic forces.

For other non - staple foods, the consumption patterns across provinces and cities are quite different. Table 5 shows the consumption trends in selected provinces for pork, the most important meat consumed in Mainland China. In 1985, the average per capita pork consumption was 11.55 kg in Henan while it was 26 kg in Sichuan. During 1985 - 1991, pork consumption had a notable increasing trend in every city and province despite the small drops in 1987 and 1988 in some provinces. These drops were likely resulted from the large increases in prices (Table 3). However, pork consumption was subject

to great fluctuations during the post-rationing period of 1993 - 1995 with both higher income and higher pork prices. Overall, the increases in consumption were more steady for most of other non-staple foods during this study period. As income rose, Chinese urban households increased their consumption of non-staple foods.

As a result of grain price subsidy, Chinese urban households have been paying a relatively small portion of their food expenditures for grain. Table 6 shows per capita annual food expenditures by food group in 1988. In Beijing, grain expenditure accounted for 11.5% of the total food expenditure which was actually smaller than that for beverages and tobacco. The items with a high expenditure share include meat, eggs, fish, fruits and vegetables.

These variations in quantity and price across provinces and cities provide important sources of information for analyzing the consumer preference for various foods in Mainland China. Based on these market data, we can estimate important food demand parameters related to income and prices for Chinese urban households.

Table 5. Trend of Per Capita Pork Consumption by Area

City / Province	Kilograms per capita per year										
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Beijing	15.57	20.30	22.41	21.88	21.19	22.30	22.87	17.44	16.89	16.32	17.49
Shanghai	16.69	18.20	18.53	16.27	18.24	21.25	20.03	19.12	20.98	19.27	19.92
Anhui	16.41	19.07	19.22	17.32	19.37	20.66	21.6	21.14	21.80	19.71	21.64
Henan	11.55	15.01	14.73	12.20	13.79	15.39	15.39	13.04	13.08	12.21	12.86
Sichuan	25.97	27.64	27.10	28.10	28.71	29.71	30.33	29.91	29.15	29.01	29.47
Shanxi	12.05	13.87	13.93	12.58	14.88	15.88	12.49	11.47	11.31	10.33	11.63

Sources : State Statistical Bureau, Income and Expenditure Survey of Chinese Urban Households, 1985 - 1995.

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Table 6. Per Capita Annual Food Expenditures by Group, 1988^a

City / Province	Grain	Meat, Eggs & Fish	Fruits and Vegetables	Beverages and Tobacco	Others	Total
Beijing	70.0	217.5	169.8	70.5	79.9	607.8
Shanghai	68.9	259.8	161.3	70.4	86.6	647.2
Anhui	67.8	208.2	113.2	72.8	45.3	507.2
Henan	90.9	141.7	109.4	62.1	44.8	449.0
Sichuan	62.2	206.5	128.9	60.7	50.1	508.5
Shanxi	86.7	128.3	111.8	49.4	129.0	505.2

Unit : Yuan

^a Grain includes coarse grain, flour, rice and other grains. Meat includes pork, beef, mutton, and poultry. Fruits and vegetables include both fresh and dried products. Beverages include liquors, beer, other wine, and tea. Others include edible oil, sugar, candy, cake, milk, and canned food.

Source : State Statistical Bureau, Income and Expenditure Survey of Chinese Urban Households, 1988.

Estimated Consumer Responses to Changes in Income and Prices

Based on economic theory, consumer demand for food is a function of income and prices. Therefore, whenever a change in income or food prices occurs, the consumer would change his / her demand for food. The degree of this responsiveness is typically measured by income or price elasticities. In order to estimate these demand elasticities, we need to select food demand models for estimation.

Previously, the research team at The Ohio State University estimated three demand systems for major foods in Mainland China. Specifically, we estimated the linear expenditure system (LES), the quadratic expenditure system (QES) and the linear approximate version of almost ideal demand system (LA / AIDS) for 10 major foods. These demand systems were estimated using the provincial level data for 1985 - 1990. Since grain and edible oil were under rationing during this period, two versions of the model were specified. One version assumed both grain and oil were strictly rationed. Therefore, the consumption level was restricted by coupons and thus the demand behavior could not be observed in the marketplace. However, since there existed a

mixed system of controlled and free markets for grain and oil, we also specified another model under which consumption behavior could be revealed by the marginal consumption in the free market. In this case, we can treat grain and oil as non-rationed goods. The model specification and estimation were documented in detail elsewhere in Chern and Wang (1994a and 1994b).

Table 7 presents the estimated expenditure and own-price elasticities of demand for 10 major foods by Chinese urban households. Since the estimates are very similar between LES and QES, we present only the QES estimates. The econometric results show that when grain and edible oil were treated as non-rationed goods, the estimated demand elasticities were very sensitive and not plausible. For example, the estimated expenditure elasticity of grain was negative in LES and QES while it was close to unity in LA / AIDS. Furthermore, both grain and oil were shown to be very insensitive to changes in prices as may be expected under rationing. These results suggest that the consumer demand behavior of grain and oil may not be clearly observable in the aggregate provincial data. Note also that the LA / AIDS model yields a very high expenditure elasticity of grain which is also higher than that of pork, fairly

Table 7. Comparison of Estimated Elasticities

Sample Period: 1985-1990 (Pooling 28 Cities and Provinces)

Item	Estimated Expenditure Elasticities				Estimated Price Elasticities			
	QES		LA / AIDS		QES		LA / AIDS	
	No Rationing	Rationing	No Rationing	Rationing	No Rationing	Rationing	No Rationing	Rationing
Grain	-0.06	NE	0.98	NE	0.05	NE	-0.04	NE
Edible Oil	0.43	NE	0.64	NE	-0.28	NE	-0.14	NE
Fresh Vegetables	0.47	0.36	2.27	1.31	-0.42	-0.59	-1.11	-1.32
Dried Vegetables	1.15	1.08	1.14	1.08	-0.88	-0.97	-1.12	-1.16
Pork	1.23	1.42	0.60	1.05	-0.75	-1.16	-0.50	-0.85
Beef	0.61	-0.89	-0.91	-1.95	-0.39	-1.78	-1.32	-1.88
Poultry	2.76	2.31	-1.28	0.74	-1.84	-1.83	-1.40	-1.97
Eggs	1.17	0.64	2.28	1.43	-0.81	-1.15	-1.32	-1.11
Fish & Shrimp	2.85	1.86	-0.26	0.77	-1.78	-2.37	-1.92	-2.21
Fruits	1.58	0.88	2.47	1.93	-1.09	-0.97	-1.10	-0.94

Sources : Chern and Wang (1994a and 1994b).

unexpected results. These estimates raise a great deal of concerns about the "No Rationing" specification.

The following discussion is based on the estimates obtained from the model treating grain and oil as rationed goods. The QES and LA / AIDS models yield the same signs of the estimated elasticities. The expenditure (income) elasticities all exhibit a positive sign except for beef. The negative expenditure elasticities of beef are not very plausible since they imply that when income increases the demand for beef would decrease, an indication of an inferior good. However, there is no reason to expect beef as an inferior good. The likely problem is that the data show a peculiar regional pattern of the price-quantity relationships. Many high income provinces have low per capita beef consumption because they are far away from beef producing regions. The supply constraint may have prevented the true demand relationship of beef from being estimated with this set of data.

The estimates reveals that the magnitudes of the estimated expenditure elasticities are quite different between the two models except for pork and dried vegetables. For example, the estimated expenditure

elasticity of vegetables is only 0.36 in the QES but it is 1.31 in the LA / AIDS. These different elasticities have different implications. Specifically, the estimated elasticities suggest that as urban household income increases, the consumer demand for fresh vegetables would be expected to increase greatly based on the estimated elasticity from the LA / AIDS while the increase in the demand for vegetables would only be small based on the estimate from the QES. However, for pork, both models show an expenditure elasticity greater than one, indicating a fairly strong income effect. These estimates imply that we can expect the demand for pork to increase as household income rises. Since these two models were fairly well fitted, the two sets of elasticity estimates are equally plausible on the basis of the estimated demand parameters. It is difficult to assert which model is more believable without further validation.

With respect to the estimated own-price elasticities, the two models show very similar estimates for most foods except vegetables and pork. In general, these price elasticities show that Chinese urban consumers are fairly responsive to changes in

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food prices. A 1% increase in price would result in more than a 1% decrease in the demand for most foods. These elasticities imply that the food demand will be very sensitive to prices. Based on economic theory, an elastic demand implies a very competitive market. Producers cannot increase their revenues unless they reduce the food prices. Therefore, if the current inflationary pressure on food prices persists, it may actually hurt the producers of those foods with a high price elasticity such as beef, poultry, and fish. Since it is not easy to predict future food prices, a high price elasticity would imply relatively more difficult to predict the future food demand in Mainland China.

In addition, we would also need to assess the substitution patterns among various foods based on the estimated cross-price elasticities. For example, our estimates from the model under "Rationing" show that the cross-price elasticity of beef demand with respect to poultry price is very large (1.455). This estimate implies that as poultry price increases by 1%, the demand for beef will increase by 1.455%, indicating a strong substitution between these two products. On the other hand, pork and beef are shown to be complements as the estimated cross-price elasticities are negative. Therefore, when the price of beef increases, the resulting impacts would be an increase in the demand for poultry (cross-price effect) but decreases in the demands for beef (own-price effect) and pork (cross-price effect).

Even though the model under "Rationing" produced more plausible estimates of the demand elasticities for non-rationed foods, it could not provide elasticity estimates for grain, the most important agricultural product in Mainland China. A few other studies by Wu, et al. (1995) and Shi, et al. (1995) included grain in their models of food demand by Chinese urban households. Unfortunately, they did not properly consider the effects of grain

rationing and therefore, their estimates are subject to model mis-specification. In order to obtain a more reliable estimate of the grain demand elasticities, we turn to the following analysis using the data in the post-rationing period.

New Evidence

In order to obtain the demand elasticities for grain, an attempt is made to estimate various food demand systems using the data from the post-rationing period. Specifically, we update our provincial-level data base to 1995. Since Chern and Wang (1994) showed similar estimates between LES and QES, we estimate only LES and compare it with LA / AIDS. We consider different sample periods including 1992 - 1995, 1993 - 1994, 1994 - 1995, and 1993 - 1995 and found that the estimation results are very robust. Therefore, we present only the estimated expenditure and price elasticities for 1993 - 1995 in Table 8. The present models include ten food items.

The results show that LES and LA / AIDS produce very different estimates of expenditure elasticities for grain and meat products. Specifically, the estimated expenditure elasticity of grain is 0.15 under LES but 1.30 under LA / AIDS. On the other hand, the estimated expenditure elasticities for pork and poultry are 1.28 and 2.37, respectively, under LES but 0.46 and 0.10 under LA / AIDS. It appears that the estimates from LES are more reasonable than those estimated in the LA / AIDS model because we normally expect grain to have a lower expenditure elasticity than animal products. The main finding is that grain is found to be a normal good with a relatively low expenditure elasticity. With respect to non-staple foods, the new estimates are, in general, consistent with the earlier findings.

Table 8. Estimated Food Demand Elasticities in the Post-Rationing Period, 1993-1995

Item	Budget Share	LES		LA / AIDS	
		Expenditure Elasticity	Price Elasticity	Expenditure Elasticity	Price Elasticity
Grain	0.20	0.15	-0.16	1.30	-0.43
Vegetable Oil	0.06	0.34	-0.30	1.28	-0.40
Sugar	0.01	0.79	-0.56	0.62	-0.43
Pork	0.17	1.28	-0.97	0.46	-1.70
Poultry	0.06	2.37	-1.48	0.10	-1.03
Other Meats	0.03	3.13	-2.36	1.03	-1.46
Aquatic Products	0.09	2.26	-1.28	0.37	-0.83
Eggs	0.06	0.85	-0.76	1.40	-1.12
Milk & Products	0.02	1.46	-1.13	1.13	-1.57
Vegetables	0.16	0.42	-0.39	1.10	-1.05
Fruits & Melons	0.10	1.19	-0.94	1.17	-1.06
Wine	0.04	0.74	-0.68	2.48	-0.51

Implication and Conclusion

In the market economy, consumers revealed their preferences by their responses to changes in income and market prices in making food choices. Since 1978, Chinese households have revealed many changes in their food consumption patterns. For urban households, per capital consumption of grain, vegetables, and sugar has been decreasing while consumption of meat, eggs and fish increasing. There is little doubt that increased household income has increased the demand for non-staple food such as meat and poultry. This is evident by the estimated expenditure elasticities which show relatively high income effects on the demand for non-staple foods.

However, our econometric analysis also shows that Chinese urban households are very responsive to changes in the prices of various foods. As evidence, the estimated price elasticities are greater than unity in absolute value for most non-staple foods. The elastic demand with respect to own price estimated for many non-staple foods such as pork, beef, poultry, eggs, and fish indicates that farm income will increase as the prices of these foods decrease. Lower prices for these foods may be achieved by

lowering costs of production and marketing. In order to reduce these costs, Mainland China will need more agricultural research and development to improve technology and efficiency. Lowering the prices of these foods will benefit not only consumers, but also producers in terms of higher farm income.

The food consumption pattern differs between urban and rural households. In particular, urban households tend to consume less grain but much more meat, eggs and fish than rural households. As migration from rural to urban areas surged in recent years, urban population has increased very rapidly. This migration trend will certainly continue in the future just like the expected household income. Therefore, the shift from grain to animal products will likely to continue and perhaps to be expanded in the future. The implication would be a tremendous increase in the demand for feed grain. Whether or not Mainland China can expand its production of feed grain would be an important issue to address. From economic standpoint, Mainland China should use its limited cropland to produce the most profitable crops with highest household demand. This study shows that the demand for non-staple foods such as fruits and vegetables has relatively

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strong income and price effects, implying a strong demand but also a highly competitive market for these products. Also, grain is a normal good even though its expenditure elasticity is relatively low. Therefore, an increase in income would continue to increase the demand for grain in the future. Furthermore, the relative demands between food grain and non - staple foods will provide proper market signals for farmers to decide on what crops to produce in the future.

With respect to feed grain, we have not estimated the demand for these products. Whether or not Mainland China should expand the production of feed grain would depend upon both domestic and foreign market conditions. The import price of feed grain would be the key factor to determine the profitability of the domestic production of feed grain in the future. The same situation would apply to livestock products such as beef, pork and poultry. Despite the growing consumer demands for these meat products, Mainland China may face pressure to open its market for the imports of beef and poultry.

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Wen S. Chern

中國大陸食物消費的轉變及其對農業的影響

陳文雄

中央研究院經濟研究所特策研究員
美國俄亥俄州立大學農業經濟系教授

摘要

本文比較中國大陸城市與農村居民歷年的食品消費型態，論述食物配給制度對於估計食品需求彈性的影響，並顯示估計的彈性及其含意。本研究估計出在配給制度廢止後的城市居民糧食支出彈性值為 0.15。同時，副食品的所得效果和價格效果相當強。由於許多副食品極具價格彈性，為提昇農家所得，因此本文建議大陸政府需要大量投資在農業的研發上以減少產銷成本，進而降低食品的價格。再者，糧食的正支出彈性及肉類和家禽類的高支出彈性顯示：未來中國大陸在食用糧及飼料糧方面將會面臨愈來愈大的需求。

關鍵字：資料、彈性、城市、農村、糧食、比較。

國立中興大學 

National Chung Hsing University