DEMAND FOR FOOD IN CHINA: PRELIMINARY EVIDENCE FROM WHOLESALE MARKETS [*]

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Abstract

One of the major changes in the industrial organisation of the Chinese food economy has been in the expansion of the role of the wholesale food markets. This paper argues that these markets are of key importance in analysing recent developments in the demand for food in China. To provide some insights into the nature of the recent reform impacts, preliminary evidence from an econometric analysis of a selected group of markets, including those in Beijing, Nanjing, Guangzhou and Shanghai, is provided. Using recent daily and monthly data from some key markets, price and expenditure elasticities for vegetables, grains, fruits, meat and aquatic products are estimated. The implications for policy and further research are also explored

Keywords
China, wholesale food markets, demand estimation

Introduction

The process of circulation of agricultural products in China is becoming of increasing interest to enhancing knowledge of the industrial organisation of the Chinese food economy (Ahmadi-Esfahani and Locke 1996). The Vegetable Basket Project, established in the late 1980s has led to rapid development of agricultural wholesale markets, and increased emphasis on these institutions as the main model for food distribution throughout this country (Hua and Hill 1996). Recent policy initiatives, aimed at expanding the number of these markets, have only served to cement this role (Xinhua 1996). These markets, due to their emphasis on competitive price formation, are perhaps the best indicators of consumer preferences currently available. Following recent initiatives in price collection and dissemination, especially by the larger markets, there are now growing data sets available for economic analysis of changes in consumption patterns in the Chinese food economy. In this paper, a preliminary analysis of data from these markets is provided. The markets chosen reflect a sample of the principal markets in Beijing, Nanjing, Guangzhou and Shenzhen, and Shanghai. While the details of all these markets are not presented here, an overview of the results for each region, and some preliminary implications for the study of the demand for food in China are explored.

The organisation of the paper is as follows. Firstly, an overview of the models, data and procedures used in the analysis is presented. In the next section, a brief overview of the results of the estimations and their implied elasticities is presented. These results are then compared to some previous studies on demand for food in China. Some brief implications are subsequently drawn prior to concluding comments.

Model, Data and Procedures

a. Model

Following Fan et al (1994a), Halbrendt et al (1994), Wu et al (1995) and Ahmadi-Esfahani and Stanmore (1996), this study applies an AIDS model to the sample data, as described in Deaton and Muellbauer (1980). An advantage of this model is that it allows the underlying utility function to have flexible properties, while maintaining a structure consistent with demand theory. Although much has been written on the limitations of the AIDS framework, it remains a highly used and practical tool for demand systems analysis.

The different commodities covered by these markets and varied levels of sophistication in their market reporting systems meant that the data for these markets could not be pooled. Accordingly, the model was applied to separate data sets for each of the four markets, in each of the different cities. The common thread was that all of these data sets consisted of direct observations from wholesale market databases, were current in their coverage (in most cases ending in mid-1996), and provided disaggregated information on a range of agricultural products.

b. Data

In Beijing, the market studied was the Dazhongsi Agricultural Products Wholesale Market. This is one of the largest in China, arguably the most important in Beijing, and the subject of a great deal of interest from government and some previous researchers (Watson 1996 and Xu 1996). Dazhongsi was established in 1986, and in a largely unregulated environment has been growing at massive rates (Dazhongsi Wholesale Market 1994). The volume of trading in 1995 rose around 19 per cent on the previous year, approximating a 95 per cent increase in the value of goods traded. This amounts to an annual turnover of 722 million kilograms, almost 80 per cent of which are vegetables, which is expected to rise to 1020 million kilograms in 1996 (Dazhongsi Wholesale Market 1996,pp1-5). The data compiled in this market are daily observations on prices and quantities sold from 1 Jan 1995 to 1 June 1996 for more than 130 commodities, directly from the Dazhongsi price reporting database. This source provided over 70,000 observations which had to be further aggregated to facilitate computer handling. The subgroups chosen were based on those used in the markets' own reporting system, these being (from largest number of observations to smallest): Fresh Vegetables, Aquatic Products, Fruit, Dry Vegetables, Grains, Meat and Poultry, Seasonings, Vegetable Oils and Dried Seafood. During the aggregation process, the average prices

and total quantities of each of these groups were calculated, and used to form the aggregated data set of 534 observations. This typically led to around 360 observations that were "usable" once missing observations were excluded.

The Zijinshan (Purple Mountain) Agricultural Products Market is one of the principal two markets to serve the 4.5 million population of Nanjing. The Zijinshan Market is fully state-owned and controlled by the Vegetables Department of the Ministry of Agriculture. Founded in the early 1990s, its most significant growth has come in the last four years. It trades a much wider variety of products than many other agricultural markets. While this is also mainly vegetables (80%), they deal in poultry and eggs (15%), and some drinks (alcohol, wine, beer), aquatic products, meats and fruits. The total value of all commodities traded has risen from 30 million Yuan in 1992 to the 1996 value of 150 million Yuan. This market supplies the consumption needs of closer to 15% of the city's population. There is some intervention in this retail vegetable market. A few commodities (around six) in each season have their prices controlled by the Price Bureau. These are commonly set as wholesale price plus 30%. For example, in summer, Chinese greens, Chinese cabbage, tomato are controlled items. The data used in this analysis come from the Nanjing City Vegetable Price Network, which cover around 20 vegetables (these vary from season to season) on a ten-daily basis from December 1994 to June 1996. To fill gaps in this series similar commodities were aggregated to give 13 groups of commodities, and just under 60 observations over time. These products include Chinese Cabbage, Spinach, Celery, Leek, Potato, Carrot, Gourds, Garlic, Other Fresh Vegetables, Tomato, Green Capsicum, Spring Onion, and Cabbage.

The Buji Market, run by the Shenzhen Agricultural Products Share Co. Ltd. is the largest wholesale market in Shenzhen, the special economic zone neighbour of Guangzhou (Canton), adjacent to nearby Hong Kong. Established in 1987, Buji has developed very quickly in the last few years in the absence of state ownership to become what is now possibly the largest food distribution centre in China (Hua and Fan 1993). In 1995 they reported exchanging 115 million tonnes of goods valued at 5.6 billion Yuan. The trade in this market is also comprehensive - dealing in around 2,000 kinds of commodities, with about 10% of these originating from overseas (Australia, Japan, etc.). However, the main focus remains on vegetables, then fruits and other food products. The data used in this analysis come from the market's reporting system, which records the price, value and quantity information for significant food products on a monthly basis from January 1993 until May 1996 (giving rise to 41 observations). These commodities were not aggregated or altered from this source, noting that the mixture of commodities, in particular the processed meat products, is somewhat different from the other markets.

The largest wholesale market in Shanghai is the Caoan Wholesale Market, which supplies around 20% of the city's vegetables. Caoan exists as a product of government and business co-operation, the total value of exchange rose from 40 million Yuan in 1992 to 560 million in 1995. The vegetables are drawn from 20 provinces, with around 30% of these actually coming from Shanghai. Unlike Guangzhou there are no imports from overseas. Prices in the wholesale market are regulated by the Vegetable Basket Project. In Shanghai they have specific offices that manage supply and demand for key commodities. The government gives different guarantees on prices to

producers of different commodities in various counties, in return they guarantee a flow of production. The Basket relates to some main vegetables, chicken, pork, fish, eggs (excluded beef, rice and fruits), which are perceived to have the largest share of daily consumption. Notwithstanding this intervention, significant seasonal variations in Shanghai's food prices were again noted, with large differences between wholesale and retail levels.

The data used in this analysis were copied directly from the markets' report books, which provide price, quantity and value data for fifteen commodities over thirty months from January 1994 to June 1996.

c. Procedures

The data sets were handled independently, in some cases needing translation and significant manipulation to get them into a computer readable format. After graphical analysis, the necessary restrictions were imposed and the system estimated. Often different aggregations of commodities were experimented with, including the introduction of dummy variables to account for seasonality. The final estimation results were used to determine uncompensated price and expenditure elasticities as described in Deaton et al (1980b). To facilitate comparison with previous studies, weighted averages of sub-groups of commodities were determined by forming weights based on expenditure shares.

Results

There was a significant variation in the quality of the estimates for each market, although all exhibited a reasonable degree of significance in key parameters. While some of the detail is not presented here, it would appear that the disaggregated data reflected strongly the price signals that were being passed onto consumers through these wholesale markets. Plots of the different data sets revealed, in most cases, a significant degree of price variation and often a pattern of seasonality. A possible exception to this was the Buji market in Shenzhen, where prices for some of the processed products appeared reasonably static, and the estimates generated by the model were generally poor.

The summary of the price and expenditure elasticities appears in Tables 1 and 2. To facilitate the comparison among analyses, weighted averages of sub-categories were included for each broad commodity group as described above.

Table 1 Own-Price Elasticities

Category	Fresh Vegetables																		Dried Vege'	Vege' Oil
	Fresh Vege	Other Fresh Vege	Chinese Cabbage	Spinach	Green Onion	Leek	Cabbage	Carrot	Chinese Onion	Spring Onion	Tomato	Potato								
Beijing Dazhongsi																				
Nanning Zijinshan											0.33								-0.77	-0.38
Shenzhen Buji	Leaf Vege		Gourd	Egg Plant		Root														
Shanghai Caoan	Green Vege	Chinese Spinach	Choy	Leek	Brewed Gourd Sprout	Egg Plant	Persim mon	Spring Onion	Sweet Carrot	Lettuce Root	Potato									
Average																				

Table 1 Own-Price Elasticities Cont'd

Category	Grain & Rice			Meat & Poultry			Aquatic Prod's		
	Grain	Rice							
Beijing Dazhongsi							Dried Seafood		
Nanning Zijinshan	-0.01						-0.08	0.24	
Shenzhen Buji	Sth Rice	Winter Rice	Canned Ham	Frozen Meat	Frozen Pork Rib Ham	Sandwic h Ham	Frozen Cutlass	Frozen Red Fish	
Shanghai Caoan							2.01	3.42	
Average	-0.02								

Table 2 Expenditure Elasticities

Category	Vegetables																Dried Vege	
	Fresh Vege																Dried Vege	Oil
Beijing Dazhongsi	1.52																0.57	1.53
Nanjing Zijinshan	Other Fresh Vege	Frozen Spinach	Cress	Cabbage	Carrot	Gourds	Garlic	Spring Onion	Green Caps'm	Tomato	Potato							
	1.58	1.24	0.87	1.13	0.80	0.78	2.42	0.69	0.62	0.68	0.55	0.61	0.39					
Shenzhen Buji					Leaf Vege					Gourds Pea			Root					
										0.66			0.75					
Shanghai Caoan	Green Vege	Green Onion	Leek	Brussel Sprouts	Green Egg Plant	Persim mon	Spring Onion	Sweet Caps'm	Carrot	Lettuce Root	Potato Root							
	0.20	0.79	0.56	0.73	1.43	1.66	2.75	0.11	1.41	1.35	2.25	1.62						

Average

Table 2 Expenditure Elasticities Cont'd

Category	Grain			Meat			
	Grain & Rice	Grain & Rice	Meat & Poultry	Aquatic Foods	Dried Seafood		
Beijing Dazhongsi	1.98	1.17	0.64		0.64	0.81	0.45
Nanjing Zijinshan		1.17	0.64				
Shenzhen Buji	Ssk Rice	Winter Rice	Canned Ham	Frozen Meat	Frozen Sandwich P'kRib h Ham	Frozen Cutlass Red Fish	
	0.24	0.89	1.09	0.97	1.04	1.04	0.16
Shanghai Caoan	1.27	0.49	1.09	0.97	1.04	1.04	0.16
Average							

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With respect to the own-price elasticities reported in Table 1, a number of observations can be made on each region. Firstly, in Beijing, it is interesting to note that the own-price elasticities are conventionally signed and reasonably low. These inelastic values are consistent with both the daily nature of the data and the consumption characteristics of food in general. Fruits and Grains are the most inelastic here. Fresh and Dry Vegetables and Seasonings being more affected by price changes. Cross-price elasticities, not reported here, indicate that, Fruits, which are noted to be relatively price inelastic, are subject to some large complementarities with some of the other fresh products, and some substitution effects from some of the less perishable commodities. It is also interesting to note that these data do not support the observation that Meat and Poultry are substitutes for each other as found in an earlier analysis (Ahmadi-Esfahani and Stanmore 1996). While this may reflect the difference in time and commodity aggregation, it may also suggest a growing sophistication in the use of these products that may be concomitant with changes in expenditure patterns that are foreshadowed by the expenditure elasticities.

In Nanjing, the own-price elasticities of demand are negative again and marginally higher than those of Beijing. This reflects not only the role of prices in determining consumption choices, but also the slightly more aggregated data sets being used. Green Capsicum, Leeks, Celery and Other Fresh Vegetables are among the most price responsive groups, the most inelastic value being recorded for Spring Onions.

When considering the Shenzhen Buji results, less significant estimates and lower elasticities are consistent with the observations from the graphical analysis that the prices in this market were less volatile. Generally the elasticities are lower than those reported for the other markets, with a possible exception being the greater price responsiveness in Fruits and the highly positive response for the Frozen Fish products. While the data do not permit a more detailed analysis of these commodities, the latter two, which make up only a small share of commodities traded on this market, are possibly inferior to the fresh products that are available. The former may appear more elastic as the average figure recorded in the market database includes a range of very high quality fresh local and imported products that are popular among the more affluent Chinese.

In the Shanghai market the database, as in Nanjing, only permitted observations on vegetables. For these commodities it can be seen that the elasticities, again predominantly low and negative, are largely consistent with the previous results. Some minor inconsistencies may be expected from the way that even similar descriptions can describe different products. Additionally, the more central nature of the Shanghai markets, involves drawing in products from a number of different growing areas in neighbouring provinces, which brings a consistency to supply that minimises variation in vegetable prices.

With regard to the expenditure elasticities displayed in Table 2, a similar level of consistency among regions can be observed. In Beijing, it is interesting to note from this analysis that Fresh Vegetables, Vegetable Oils, Grains and Fruit have expenditure elasticities that are significantly higher than unitary, while Dry Vegetables, Meat and Poultry, Aquatic Products, Dried Seafood and Seasoning are significantly lower. The implication of this finding is that as total

expenditure increases, the share of the budget devoted to Fresh Fruit and Vegetables, Grains and Vegetable Oils will also increase. By contrast, the levels of expenditure on the remaining commodities will also increase, but their total share in expenditure will decline, especially in Dried Products, Meat and Aquatic Products.

In Nanjing, it is interesting to note that, once again, the expenditure elasticities indicate that as the consumers income increases, the share devoted to Carrots, Fresh Vegetables, Celery and Carrots will also increase, while others, particularly Potatoes, will decrease. While the product mix is different from that observed in Dazhongsi, the trend toward greater use of Fresh, and more perishable, Vegetables is a common theme here. As all of the expenditure elasticities are positive, they are all likely to increase in demand in the future.

In Shenzhen, these elasticities reflect the range of expensive fresh fruit products that are noted in the discussion of price responsiveness. Similarly, low values for the frozen seafood and vegetable products are consistent with the earlier observations on price elasticities for these products that would suggest that the future growth in this market will be in the trade of fruit products. Again, the data do not permit closer examination on which specific fruits this may involve; however, personal observations on the content of the market indicated that high quality and exotic fruits were commonplace in this institution.

In Shanghai, the expenditure elasticities are a little more mixed, although on average again consistent with the similar Nanjing database, and even the results from other cities. The unusual positive results for Leeks should not be of great concern, as this was the least important component of the market's current trade.

In summary, in both the price and expenditure elasticities there is a remarkable degree of similarity across regions. While different markets have different focuses in terms of quality and commodities and different levels of disaggregation in their databases, some general observations are possible. That is, that demand response at the wholesale level was generally negative and inelastic, and that expenditure elasticities were reasonably consistent in suggesting a good prospect of further growth in Fresh Vegetables and Fruits demand. To test the robustness of these broad observations on the demand for food in China, a comparison of the main results is carried out below.

Previous Findings on the Demand for Food in China

A number of previous studies have analysed the demand for food in China. These include Tang and Stone (1980), Van der Gaag (1984), Yang (1985), Carter and Zhong (1988), Lewis and Andrews (1989), Halbrendt and Gempesaw (1990), Peterson et al (1991), Huang and David (1993), Chang (1994), Chern and Wang (1994), Fan et al (1994a), Fan et al (1994b), Halbrendt et al (1994), Samuel (1994), Wu et al (1995) and Ahmadi-Esfahani and Stanmore (1996). The results of these studies are summarised in Table 3.

Table 3. The Demand for Food in China

Category	Own-Price Elasticities					Expenditure Elasticities				
	Vege's	Fruits	Grain & Rice	Meat & Poultry	Aquatic Prod's	Vege's	Fruits	Grain & Rice	Meat & Poultry	Aquatic Prod's
[illegible]	-0.76	-0.22	0.02	-0.12	0.16	1.07	1.63	0.83	0.81	0.75
Ahmadi-Esfahani et al (1996)	-0.15	-0.36	0.39	-0.28	0.39	0.77	1.14	0.85	2.48	1.01
Wu Et al (1995)	-0.88	-1.14	-0.70 [a]	-0.65 [b]	-1.40	1.19	1.45	0.98 [a]	1.17 [b]	0.20
Halbrendt et al (1994)	-0.10	-0.32	-0.23	0.09 to -0.66 [c]		0.91	1.84	0.58	1.09 to 1.27	
Fan et al (1994)	-0.47		-0.46 to -0.55 [d]	-0.60		1.20		0.31 to 0.50	1.78	
Chern et al (1994)	0.42 to 0.59	-0.95 to -1.10	0.04 to 0.05	-0.05 to 1.84 [e]		0.22 to 0.47	0.88 to 1.58	-0.06 to 3.01 [g]	0.50 to	
Lewis et al (1989)			0.14	0.09 to -0.23 [f]	-0.69			0.22	1.02 to 1.95 [h]	1.65

a this figure is for rice only; b this figure is for pork only; c 0.09 is for poultry and -0.66 for meat; d 0.46 is for wheat and -0.55 for rice; e -0.05 is for beef and -1.84 for poultry; f -0.09 is for poultry and -0.23 for pork; g 0.50 is for beef and 3.01 for poultry; h 1.02 is for pork and 1.95 for poultry.

The earlier studies of Tang and Stone (1980), Van der Gaag (1984), Yang (1985) and Carter and Zhong (1988) are rather limited. Tang and Stone (1980) estimated grain consumption by a method of moving averages, with the underlying assumption that the total consumption was determined by the government. Van der Gaag (1984) made improvements on Tang and Stone's model by placing greater emphasis on the impact of income on demand, providing projections of consumption based on Engel curve analysis. Similarly, Yang (1985) based the individual's determination of consumption on income. Carter and Zhong (1988) specified per capita consumption levels for grain as a function of income and established consumption habits, providing estimates for both the rural and urban sector. These studies are very specific, dealing mostly with the grains sector, based on extremely aggregated data and involve highly simplified models of consumption behaviour. These limitations, along with the outdated data used, hamper the relevance of their findings.

Lewis and Andrews (1989) and Chern and Wang (1994) applied the Linear Expenditure System (LES), or adaptations of it, to data from Chinese government sample surveys for the years 1982 to 1985 and 1990, respectively. Both studies found the demand for food to be inelastic with respect to income. The study of Chern and Wang (1994) found urban consumers extremely price inelastic with respect to grain and oil, but more price elastic for meat and fruits. However, these

studies are limited as LES models rely on a specific form of utility function and do not allow complements or inferior goods to exist (Powell 1974, p38).

Studies by Fan et al (1994a), Halbrendt et al (1994), Wu et al (1995) and Ahmadi-Esfahani and Stanmore (1996) all utilised the AIDS model. The first two studies analysed rural consumption, utilising pooled provincial level data from 1982 to 1990, and consumption expenditure survey data for 1990, respectively, having been extracted from Chinese government agency surveys. They report similar findings of very low expenditure elasticities for grains but higher elasticities for the remaining foods, particularly meat. The price elasticities are found to be low for all foods, particularly in the study of Halbrendt et al (1994) The study of Wu et al (1995), based on a 1990 survey for a cross-section of 33 urban Chinese cities, finds similar expenditure elasticities, although its own-price elasticity estimates tend to be higher than those obtained in the previous two studies implying that the urban consumers are more price responsive than the rural consumers. Similarly, the results of Ahmadi-Esfahani and Stanmore (1996) showed further evidence of changing demand patterns in many commodities over recent years.

Although providing useful information, all the previous studies, except Ahmadi-Esfahani and Stanmore (1996), are based on Chinese government collected data which tend to be very aggregated across time and commodities. Further, the studies of Halbrendt et al (1994) and Wu et al (1995) are based on a data samples of only one year. Additionally, with the exception of Ahmadi-Esfahani and Stanmore's (1996) 1991 to 1994 data set, the next most recent data set is based on 1990. The dynamic nature of the development and growth of Chinese wholesale markets since this time may have reduced the usefulness of these earlier studies.

When comparing these results with the current findings, a number of general observations can be made. Firstly, it can be seen that the own-price elasticities for this analysis are generally low and negative; an observation generally consistent with the previous findings. This is especially so for vegetables, although otherwise the values are slightly more inelastic. Similarly, from the expenditure elasticities, previous studies have tended to be more optimistic about the growth prospects for meat and poultry, which appeared to generate lower expenditure elasticities in this study in both Beijing and Shenzhen.

The discrepancies in magnitudes of these estimates may be explained by a number of factors, such as the greater levels of disaggregation in the data sets in both the commodity classifications and observations through time. Similarly, these could also have been a factor in the way that consumption patterns are likely to have changed from those reported in the previous studies. It is argued that these less aggregated commodity descriptions, and more contemporary and detailed observations are more likely to be closer to the true values for these products.

Implications

The findings of this study confirm the expectation that the demand for individual wholesale food groups in China is price inelastic. However, the structure of the estimated elasticities appears

to be changing from previous analyses. For expenditure elasticities, the positive values for all foods indicate that the demand for food is on the rise as income and thus expenditure increases. However, the findings also indicate that the rate of expenditure on the different food groups will vary, again in a manner that is somewhat different from previous estimates. Specifically, a greater proportion of expenditure will be on Fresh Vegetables and Fruits, and not necessarily on Meat and Poultry and Aquatic Products, as other studies have suggested. This implies that future Chinese consumption may be more aligned with traditional consumption than may have previously been realised, or that there are refinements in the way that these traditional foods are being used to make them continue to be attractive in the presence of rising incomes and economic growth.

Further, the results suggest that the growth areas in Chinese food consumption are expected to be in that Fresh Vegetables, Vegetable Oils, Grains and Fruits. In particular, the very large expenditure elasticity found for Fruits and Fresh Vegetables imply that these will experience a substantial growth in demand as income rises in China. Future production or import levels of these products will, therefore, need to rise. This may create opportunities for exporters of some of these foods to China.

On the whole, there appear to be reasonable opportunities in a number of the Chinese food industries. The scope of these opportunities for any participant in any industry will still depend on Chinese government policies with respect to that particular industry and pertinent import regulations. Market forces, however, appear to be playing a substantial role in shaping Chinese food markets. As wholesale markets play an increasing role in circulation and the marketing of food products, they will be able to provide further insights into the nature and direction of these changes and the opportunities that they may bring.

Concluding Comments

The findings of this study provide useful information on the demand structure of some of the growing wholesale food markets of China. This information will be essential input in any investigation of production, consumption, marketing and world trade of food. However, given the likely continued growth and development of these markets, further studies investigating the wholesale markets across China are warranted to test the consistency of the results of the current study, or any departures from them. In addition, a more disaggregated analysis of the individual vegetables, grains, fruits and meats in the wholesale markets may provide more plausible empirical knowledge on food demand. Finally, any studies that could be undertaken at the retail level would also be likely to provide still more robust estimates of food consumption patterns in China. The current paucity of data continues to be the key constraint impinging on this venture.

References

Ahmadi-Esfahani, F.Z. and Locke, C.G. (1996) The Industrial Organisation of the Chinese Food Economy. Contributed paper presented at the Australian Agricultural and Resource Economics Society 40th Annual Conference held at the University of Melbourne, February.

Ahmadi-Esfahani, F.Z. and Stanmore, R.G. (1996) Estimating the Wholesale Demand for Food in Beijing. Contributed paper presented at the Australian Agricultural and Resource Economics Society 40th Annual Conference held at the University of Melbourne, February.

Carter, C.A. and Zhong, Funing (1988) China's Grain Production and Trade: An Economic Analysis. Westview Press, Boulder and Colorado.

Chang, P. (1994) Planned Marketing Channel and its Impacts upon the Quantitative Pattern of the Chinese Food-Grain Consumption. Agribusiness: An International Journal, 10(3):207-228.

Chern, W.S. and Wang, G. (1994) The Engel Function and Complete Food Demand System for Chinese Urban Households. China Economic Review, 5(1):35-37.

Deaton, A. and Muellbauer, J. (1980) An Almost Ideal Demand System. Am. Econ. Rev., 70(3):312-26.

Deaton, A. and Muellbauer, J. (1980b) Economics and Consumer Behaviour. Cambridge University Press, Cambridge.

Dazhongsi Wholesale Market (1994) Beijing Dazhongsi Farm and Sideline Products Wholesale Market. Dazhongsi Wholesale Market, Beijing.

Dazhongsi Wholesale Market (1996) Dazhongsi Agricultural Products Wholesale Market Annual Report 1995. Dazhongsi Wholesale Market, Beijing.

Fan, S., Cramer, G. and Wailes, E. (1994a) Food Demand in Rural China: Evidence from Rural Household Survey. Agric. Econ., 11(1):61-69.

Fan, S., Wailes, E. and Cramer, G. (1994b) Impact of Eliminating Government Interventions on China's Rice Sector. Agric. Econ., 11(1):71-81.

Halbrendt, C. and Gempesaw, C. (1990) A Policy Analysis of China's Wheat Economy. Am. J. Agric. Econ., 72(2):268-277.

Halbrendt, C., Tuan, F., Gempesaw, C. and Dolk-Etz, D. (1994) Rural Chinese Food Consumption: The Case of Guangdong. Am. J. Agric. Econ., 76(4):794-799.

Huang, J. and David, C. (1993) Demand for Cereal Grains in Asia: the Effect of Urbanisation. Agric. Econ., 8(2):107-124.

Lewis, P. and Andrews, N. (1989) Household Demand in China. Appl. Econ., 21(6):793-807.

Peterson, E., Lan, J. and Ito, S. (1991) An Econometric Analysis of Rice Consumption in the People's Republic of China. Agric. Econ., 6(1), 67-78.

Powell, A. (1974) Empirical Analysis of Demand Systems. Lexington Books, Canada.

Samuel, N. (1994) The Market for Processed Food and Beverage Products in Urban China. Rural Industries Research and Development Corporation Paper No 94/11. Union Offset. Canberra.

Tang, A.M. and Stone, B. (1980) Food Production in the People's Republic of China. International Food Policy Research Institute, Research Report No. 15. Washington DC.

Van der Gaag, J. (1984) Private Household Consumption in China. World Bank Staff Working Paper 701, World Bank: Washington DC.

Watson, Andrew (1996) Conflict Over Cabbages. the Reform of Wholesale Marketing. In Ross Garnaut, Guo Shutian and Ma Guonan (Editors). The Third Revolution in the Chinese Countryside. Cambridge University Press, Cambridge. pp. 144-166.

Wu, Y., Li, E. and Samuel. N.S. (1995) Food Consumption in Urban China: an Empirical Analysis. Appl. Econ. 27(6):509-515.

Xinhua (1996). "Wholesale Markets to be Erected". China Daily, Wednesday, July 10, p2. Beijing.

Xu Boyuan (1996) Agricultural Wholesale Markets. In Ross Garnaut, Guo Shutian and Ma Guonan (Editors) The Third Revolution in the Chinese Countryside. Cambridge University Press, Cambridge, pp.113-119.

Yang, S. (1985) Using a Statistical Data Approach to Forecast Consumption Structure for a Comfortable Standard of Living. In The Structure of China's Domestic Consumption - Analyses and Preliminary Forecasts. World Bank Staff Working Paper 755. World Bank, Washington DC.