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Regional Difference in Food Consumption Away from Home of Urban Residents: A Panel Data Analysis

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Abstract: China's economy has been developing rapidly and people's living standards have improved during the past decades. With the acceleration of modern life rhythm and change of consumption concept, the food consumption pattern of urban residents has changed largely. Urban Households begin to pursue nutritious, fresh, convenient and fast food, and dining out becomes a consumption fashion. The overall goal of this paper is to better understand food-away-from-home (FAFH) consumption in urban China. We use a secondary panel data food consumption of urban residents at the provinces (municipalities) level to examine the trends in FAFH during 2000-2008. Particularly, we use fixed effects regression model to analyze the main factors through which people's food-away-from-home expenditure and regional propensity to consume are affected. We find that, nowadays income is the most important socio economic factors that determine the food-away-from-home consumption of urban residents, and people's FAFH consumption is highly elastic, the income elasticity of FAFH is higher in the low income group than that in the medium and high income group. Additionally, people's consumption propensity towards dining out in western China is somewhat higher than that in eastern and central regions in China. FAFH high-income elasticity provides a good indicator for FAFH demand.

Key Words: households in urban area; food-away-from-home; regional difference; panel data

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1. Introduction

During the past 30 years, the sociodemographic and economic structure of China has changed significantly. Coupled with an increasing income and urbanization, people's lives are changing from families to societies, food consumption patterns have changed over time as a result of development. Until the 1980s, there was relatively little value added in China's food sector and food-away-from-home (FAFH) consumption. Households have their most meals at home with grain, vegetables, and meat. Since 1990s, Chinese consumers have begun eating more meals in restaurants, cafeterias, and dining halls. In 2009, the total retail value of meal and beverage is 1799.8 billion yuan, according to vice president of China Cuisine Association, Yangliu predicts, and the total retail value of meal and beverage will reach two thousand billion yuan in 2010. Among the total retail value, resident consumption accounts

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for 60%, and business affairs consumption comes down to 40% (MOC), and household consumption is becoming the main body strength of FAFH consumption gradually.

China service sector's value accounts for 40% of its GDP with food processing and food services a major component in recent years. With one-fifth of the world's consumers, many observers believe that China will finally emerge as a major force in world food service markets. The increase in FAFH expenditures implies that there is growing demand for high value and specialty food products and restaurant services. Although FAFH is generally taken as a result of economic growth, it can also stimulate the development of other economic activities especially in the service sector such as franchising, packaging and catering (Radam et al., 2006). So it is inherently important to understand the demand of FAFH, this emerging consumption pattern can be of significant interest to policymakers for a number of reasons. The U.S. Department of Agriculture has identified the FAFH issue as one of the key research topics related to China's food and agriculture sectors (Gale, 2002).

Previous studies have investigated FAFH issues with China's household survey data. Min et al., (2004) examine the pattern and trends of FAFH expenditure by China's urban residents during the 1990s. They use a popular parametric linear specification and a newly developed nonparametric estimation method (with mixed categorical and continuous variables) to estimate the FAFH expenditure. Ma et al., (2006) employ a normal Tobit model, to study the trends in FAFH of urban residents and analyze the determinants of different groups of consumers participated in the new pattern of dining out. In addition, Ma et al.,(2001) use China's rural household-level survey data in 1998 to analyze the trends and determinants of FAFH. They apply the generalized Heckman two-step estimation procedure to correct for selection. Previous studies have identified monthly household income, individual consumer education, family size, consumer age etc., as important determinants of FAFH expenditure.

The objectives of this study are to (1) characterize the FAFH consumption expenditure pattern in urban China since 2000s; (2) identify main factors that affect FAFH of urban residents; and (3) compare income elasticity of FAFH demand in different group. In addition, a better understanding of these factors could provide government authorities with useful information on the structure of the food distribution industry and the nutritional intake in urban China. To meet these objectives the paper is organized as following. In Section 2, we first briefly describe the data and models. Section 3 reports the food consumption patterns changing in urban China. Estimation results and Conclusions are given respectively in Section 4 and Section 5.

2. Data and models

Data summary

The data used in our study are derived from China's national statistical book (CNSB) and provincial statistical books. The data from CNSB includes per capita income, per capita expenditure, per capita food expenditure, Engel's Coefficient, and both national and provincial FAFH expenditure information. Provincial statistical books offer the province price index of FAFH food over the years. We use macro data across all provinces in 1999 and 2008 to examine China's FAFH consumption pattern.

Econometric models

Previous studies with household surveys data usually involve estimation of some censored regression models such as Tobit model (McCracken & Brangdt, 1987; Heng and Guan, 2006; Ma et al., 2006; Fabiosa, 2008), or nonparametric model (Min et al., 2004), or two-step estimation procedure (Byrne et al., 1996). However, some censored regression models are not suitable for macro data of FAFH expenditure, and we will only report the panel data model.

Since we have a relatively short time period (over 10 years) and a long cross section (31 provinces), and the classification of the FAFH of urban China remains constant over the study period, we adopt the fixed effect estimation for empirical analysis. Following the theoretical framework of consumption demand theory and household economy behavior theory, per capita income, price index, lagged FAFH expenditure are putted into the model as explanatory variables. We found that the best models are based on logged values of FAFH expenditure, per capita income and lagged FAFH expenditure. Price index has not been converted to log values as they need to be kept in level values. So, we can define the functional form:

$$\log(C_{it}) = \alpha + \beta_1 \log(I_{it}) + \beta_2 P_{it} + \beta_3 \log(C_{i,t-1}) + \varepsilon_{it}$$

Where C_{it} is per capita annual FAFH expenditure of urban China in the i th province by the t th year, I_{it} is the per capita annual income of urban China in the i th province by the t th year, P_{it} is the price index on FAFH food in the i th province by the t th year, $C_{i,t-1}$ is the expenditure on FAFH in the i th province by the $t-1$ th year. α is constant, and ϵ_{it} is random disturbance. Here, i th including 1, 2, 3, ..., 20, ..., 31 provinces, t th including 2000, 2001, ..., 2008 year. A useful characteristic of log models is that the value of the coefficient on $\log(I_{it})$ can be interpreted as the income elasticity.

3. Food Consumption Patterns Changing in Urban China

the Expenditure of Food Away from Home has been increasing significantly

Since 2000s, the income of China's residents has grown greatly. With taken in account of inflation, disposable personal income in China totaled 8132.72 yuan in 2008, more than twice the 3711.83 yuan in 2000. During the same period, urban residents' income per capita in China rose by 112.53% and grewed at 9.88% annually in average from 2000 to 2008, and reached 13347.13 yuan in 2008 (Table 1, column 1). In comparison to rural residents, the growth rate was greater obviously.

Along with the rapidly growth of income, the living standard of China's residents reached a new peak, especially for urban residents. In 2000, Engel's Coefficient of rural households decreased to 49.10%, while Engel's Coefficient of urban households decreased to 39.44%, then reduced gradually, reached 37.89% in 2008 (Table 1, column 3 and 4). According to FAO Reference standard, the Engel's Coefficient is 40% or less, and means that the living standards of Chinese urban households for the wealthy. Undoubtedly, rising income is one of the most important forces affecting the type of food consumed. Fan and Agcaoili-Sombilla (1997) have noted that the income elasticities of per capita food expenditure are approaching zero, which mean that the richer consumers did not spend significantly more on food.

Table 1. Income Growth and the Change of Engel's Coefficient in China

Year	Per Capita Income (yuan)		Engel Coefficient (%)	
	Urban	Rural	Urban	Rural
2000	6280.00	2253.40	39.44	49.10
2001	6812.43	2385.25	38.20	47.70
2002	7727.12	2528.39	37.68	46.20
2003	8422.72	2680.44	37.10	45.60
2004	9067.72	2919.92	37.70	47.20
2005	9940.30	3210.51	36.70	45.50
2006	10976.45	3502.98	35.80	43.00
2007	12313.18	3895.30	36.29	43.10
2008	13347.13	4229.54	37.89	43.67

Note: Per capita income was deflated by urban consumer price indices, both sets of columns are in 2000 real terms.

Source: China Statistical Yearbooks, 2001-2009

Rising income has a major impact on the structure of China's food consumption. As income rises, there is more money to spend on personal services and other discretionary items. Some of these additional services are purchased along with food. According to the CNSB data, the composition of food expenditures has changed significantly, FAFH consumption demand has increased greatly. In 2008, per capita food expenditure of urban China is 3725.82 yuan, which is 1.90 times of 2000's. FAFH expenditure reaches to 785.02 yuan, which is 2.73 times of 2000's. The increased speed of FAFH expenditure is more quickly than of total food expenditure. Between 2000 and 2008, while the share of urban food expenditures spent on food consumed at home declined from 85.30% to 79.39%, the share of food expenditure on FAFH rose from 14.70% to 20.61% (Table 2, columns 3 and 4).

Table2. The Change of Food Consumption Pattern in Urban China

Year	Per capita expenditure	Per capita food expenditure	Per capita food expenditure	
			share, at home (%)	share, out-of-home (%)
2000	4998.00	1958.31	85.30	14.70
2001	5270.73	2690.98	84.40	11.68
2002	6075.49	2285.44	81.80	18.20
2003	6435.71	2336.70	81.87	18.13
2004	6931.94	2466.15	80.31	19.69
2005	7801.67	2831.98	79.16	20.84
2006	8570.75	3040.56	77.79	22.21
2007	9542.06	3229.49	79.03	20.97
2008	10620.03	3725.82	79.39	20.61

Note: Urban per capita expenditure was deflated by urban consumer price indices, and urban per capita food expenditure was deflated by urban food price indices. Both sets of columns are in 2000 real terms.

Source: China Statistical Yearbooks, 2001-2009

the FAFH Expenditure in Eastern and Western Region are higher than Central China

In China, regional difference is undoubtedly one of most important reasons affecting the type of food consumed. Since consumption habit and income level have gaps across regions, nowadays, the disparity for FAFH expenditure is apparent among Eastern, Central and Western in urban China. According to our data, the urban residents in Eastern and Western China, spend significantly more on FAFH than Central region, especially for eastern China.

The proportion of income is spent for FAFH food among urban residents of different regions is shown in Table 3. According to China's partition planning of area in 2003, this study divides 31 provinces into three groups: eastern, central and western regions. By comparison, we can find that FAFH expenditure of the central China is less than eastern and western regions. Between 2000 and 2008, the share of food expenditure on FAFH rose in three regions, the increasing extent of central China relatively less, grow by 5.97 percentage point, reached 17.35% in 2008. Meanwhile, the increasing extent of eastern China relatively more, grow by 9.30 percentage point, rose from 12.74% to 22.04%. Obviously, entering new century, the regional difference of FAFH expenditure is increasing, which is correlated closely with regional disparities in income, urbanization, and consumption habit.

Table3. Share of FAFH Expenditure in Food Expenditure in the Eastern, Central and Western Urban Area

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Eastern China	12.74	14.47	14.29	17.45	16.35	18.50	19.48	21.81	22.04
Central China	11.38	12.38	12.61	13.64	13.20	15.44	17.38	17.88	17.35
Western China	12.58	14.22	14.52	16.79	16.20	18.50	19.37	20.92	20.71

Eastern China: Liaoning, Hebei, Beijing, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hainan provinces.

Central China: Heilongjiang, Jilin, Inner Mongolia, Shanxi, Henan, Hubei, Jiangxi, Anhui, Hunan, Guangxi provinces.

Western China: Shaanxi, Ningxia, Gansu, Qinghai, Tibet, Xinjiang, Sichuan, Chongqing, Yunnan, Guizhou provinces.

Source: China Statistical Yearbooks, 2001-2009

FAFH Expenditure increases faster for the Low-income group

Although the share of FAFH expenditure in Eastern is higher than Central and Western China, the marginal consumption tendency increases in low-income areas. Recent years, FAFH demand has been of one of the main

causes that urban food composition expenditures has changed in low-income areas. Furthermore, based on per capita annual income from 2000 to 2008, our analysis divides 31 provinces into three income groups, that is low-income group, medium-income group and high-income group to study FAFH expenditure among different income regions. The high-income area's annual per capita income is more than 10000 yuan which includes Beijing, Shanghai, Guangdong, Zhejiang, Tianjin, Fujian, Jiangsu and Shandong provinces; the low-income area has income less than 8000 yuan, which includes Heilongjiang, Shanxi, Qinghai, Guizhou, Gansu and Xinjiang; other provinces belong to medium income area.

Comparing the rise in FAFH expenditures among different income groups, we can see that FAFH demand in the low-income area grows faster than the medium income area and high income area. The share of FAFH expenditure in low-income area rises from 11.18% to 21.00% (table 4, column 1 and 8) between 2000 and 2008, grows by 9.82 percentage, while the proportion of the high income area and medium income area have improved 9.42 and 6.20 percentage respectively.

Table4. the Share of FAFH Expenditure in Food Expenditure in the Different Income Group

	Per capita income (yuan/year)	2000	2001	2002	2003	2004	2005	2006	2007	2008
High-income group	More than 10000	14.32	16.35	16.46	19.35	18.22	20.52	21.68	23.15	23.74
Medium-income group	8000–10000	11.68	12.46	12.20	14.05	13.24	15.64	16.81	18.24	17.88
Low-income group	Less than 8000	11.18	13.58	14.51	16.67	16.60	18.36	19.92	21.55	21.00

Source: China Statistical Yearbooks, 2001-2009

4. Estimates and Results

A panel data approach is used to obtain the parameter estimates for the FAFH expenditure. Estimation results of the fixed effect model are reported in Table 5 with estimated coefficients, the t-test statistics and R^2 . The first column depicts the effect of income changes on the expected value of the dependent variable, the third column indicates the marginal effect of price changes on FAFH expenditure, the fifth column is reported with estimated coefficient of lagged FAFH expenditure. R^2 value of each equation regression results is above 0.80, hence, the model is concluded as having a good fit.

Income

Following a priori expectations, the estimation results verify the significant relationship between income levels and demand for FAFH. The coefficients of the income variable in all expenditure equations are positive and highly significant (Table 5, column 2). Increase in demand of FAFH has been driven by rising incomes. The income elasticity shows that on all sample, for each 1 percent rise in income, expenditure on FAFH rose by 1.5097 (Table 5, column 1). However, income elasticity of demand decreased with respect to income level, holding other things constant, suggesting that FAFH demand is higher among the low income group (1.6811 for income per capita less than 8000 yuan), compared to medium income group (1.5234) and high income group (1.3402 for income per capita more than 10000 yuan). That is, the low income group is the urban consumer that is more likely to be eating out due to the rapid rise in their income. For low income group, their FAFH expenditure increases by 1.68% as per capita when annual income rises by 1%.

When considering the regional disparity, the model result is similar to income group. For western China, urban consumers' FAFH demand is higher than other region, the rise of incomes by 1% causes the increase of the food expenditures by approximately 1.56%. In the observed period, income elasticity is lower both eastern China and central China, for each 1 percent rise in income, expenditure on FAFH rise by 1.4731 percent in central China and 1.5049 percent in eastern China. These findings are not consistent with those of Ishida et al. (2003), Nik Mustapha et al. (2001) and Lee (1991), who found that higher income households have higher FAFH expenditures compared to those with lower income. In general, wealthier households have more income, and they can offer higher FAFH expenditure compared to households with tighter budget constraints.

Price

The price index on FAFH food is statistically insignificant in explaining FAFH expenditure (Table 5, column 3 and 4). This result is also supported by analyses by income group and area group. This means that price does not have any influence on FAFH expenditure patterns in China. One possible explanation for this finding is that eating-out has become a regular feature of the Chinese lifestyle such that everyone, regardless of age is likely to indulge in this activity on a daily basis. The finding that price appears not to affect total FAFH expenditures is not unexpected.

Lagged FAFH expenditure

Similar to the price index variable, the coefficient of lagged FAFH expenditure is positive, but it is not statistically significant in explaining the FAFH expenditure. A plausible reasoning for this finding is that habit does not have a significant effect on eating-out, it is also better indicated that the crucial role of income on FAFH expenditure. Level of development is positively related to the increase in demand of FAFH.

Table5. Summary Statistics for Fixed Effect Model Analysis of Expenditure on FAFH in Urban China

	$I_{it}(\beta_1)$		$P_{it}(\beta_2)$		$C_{i,t-1}(\beta_3)$		R ²
	coefficient	t-test	coefficient	t-test	coefficient	t-test	
All sample	1.5097	29.89***	0.0048	0.75	-0.0259	-1.14	0.8454
Income groups							
High-income group	1.3402	17.17***	0.0041	0.50	-0.05570	-1.31	0.9024
Medium-income group	1.5234	18.62***	0.0123	1.11	0.0011	0.03	0.8069
Low-income group	1.6811	23.72***	0.0014	0.15	-0.0956	-2.61**	0.9328
Area groups							
Eastern China	1.5049	16.70***	0.0018	0.17	-0.0492	-1.26	0.8451
Central China	1.4731	15.84***	0.0113	0.82	-0.0091	-0.24	0.8617
Western China	1.5590	17.28***	0.0046	0.42	0.0267	-0.43	0.8277

Note: *** indicates at 1% level of significant, **indicates at 5% level of significant.

5. Conclusion

Results of this study may have important implications for the food industry in China as it indicates that per capita income significantly affect eating out of urban China, and the estimate coefficients of income are positive and more than 1. FAFH expenditure is highly elastic, among different income group and regions, as income grows income elasticities of demand are expected to increase. These findings is also consistent with those of Ma et al.(2001), who found that income is an important determinant of total FAFH expenditure in rural China with household data. Meanwhile, our study shows that consumption inclination of FAFH in low income area is higher than in medium and high income area. This finding is consistent with Keynesians' theory, the marginal consumption inclination decreases slowly, that is consumption increase along with income growing, but the room being used to increase consumption in what be increased by income will be much less in future (Wu and Lee, 2004).

Some notable implications can be drawn from the estimates. First, similar to the trend in other countries, it is expected that the change in Chinese food expenditure patterns toward FAFH will continue, occurring alongside the increase in income and urbanization due to economic growth. As such, this would provide great business opportunities for the development of food service industry in China. Second, when considering the viability of future business locations, the food service industry may target markets consisted of urban locales who got high disposable income and target markets of eastern and western china in the future.

Finally, this study may have several limitations due to the nature of the secondary data set. In the attempt to act as a catalyst for further research on Chinese household expenditure patterns, particularly on FAFH, this study has shown that it is necessary to have an initial understanding of the factors that accelerate the change of expenditure patterns.

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