Haining Wang, Zhiming Cheng and
Russell Smyth

Does consuming more make you happier? Evidence from Chinese panel data

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Abstract

This study examines the relationship between consumption and happiness, using panel data from China Family Panel Studies (CFPS). We find that total consumption expenditure has a significant and positive effect on happiness, but we find no evidence of a non-linear relationship between consumption and happiness. There are heterogeneous effects of consumption on happiness across subsamples and for different types of consumption expenditure. We find that relative consumption matters, irrespective if the reference group is defined in terms of consumption at the community or county level or on the basis of age, education and gender. However, the extent to which comparison effects are upward looking, or asymmetric, depend on how the comparison group is defined. We also find that comparison with one's past consumption has no significant effect on an individual's happiness.

Keywords: happiness, consumption, China.
Jel codes: A13; E21; I31; N35.

Haining Wang, Centre for Economic Research, Shandong University, China.

Zhiming Cheng, Centre for the Health Economy, Macquarie University, Australia;
email: zhiming.cheng@mq.edu.au.

Russell Smyth, Department of Economics, Monash University, Australia.

"We no longer live life. We consume it." Vicki Robin

1   Introduction

Several studies have examined the relationship between an individual's income and their happiness (Clark, Frijters and Shields 2008, Powdthavee 2010). Findings from these studies are mixed and differ across countries (Dolan, Peasgood and White 2008, Headey, Muffels and Wooden 2008, DeLeire and Kalil 2010). There is, however, a dearth of research on the relationship between consumption and happiness. In this study we use data from China Family Panel Studies (CFPS) to examine the relationship between happiness and consumption in China. The relationship between happiness and consumption expenditure is especially important in developing countries, such as China, in which patterns of consumption have changed rapidly in recent years and can be expected to materially impact on people's utility levels (Min 2009, Xu, Zhang and Allenby 2008).

The relative lack of research on the relationship between consumption and happiness is surprising, given that economic theory suggests that the most relevant measure of utility, or satisfaction, is consumption, rather than income. Economists have long argued that consumption is a better measure than income, and that the role played by income in the happiness function is, at best, a noisy proxy for consumption (Meyer and Sullivan 2003, Weinzierl 2005, Dynan and Ravina 2007). The rationale for so arguing is that consumption data reflects individuals' spending behaviour and, thus, directly reflects whether the acquisition of specific goods or services makes them happier (DeLeire and Kalil 2010). Others have argued that income is not the only, and is certainly not necessarily the best, indicator of material living standards and that consumption is at least as important as income in assessing standard of living (Headey et al. 2008). People seek to smooth their consumption over time, even if their current incomes fluctuate. This reflects the fact that a high proportion of households in the bottom half of the income distribution consume more than they earn (Slesnick 1998).

Among the few existing studies to examine the relationship between consumption and happiness, most focus on the G7 economies (DeLeire and Kalil, 2010; Headey, Muffels and Wooden, 2008; Noll and Weick, 2015; Zhang and Xiong, 2015) or other high-income countries (Dumludag, 2015; Headey et al., 2008). The only studies that have focused on developing or transitional economies are Dumludag (2015) (transition economies

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in Europe), Headey et al. (2008) (Hungary) and Gokdemir (2015) (Turkey). Most of these studies employ cross-sectional data (DeLeire and Kalil, 2010; Dumludag, 2015; Gokdemir, 2015; Zhang and Xiong, 2015). The only studies to use panel data are Heady et al's (2008) study for Australia, Hungary and the United Kingdom and Noll and Weick's (2015) study for Germany. While Heady et al. (2008) employs panel data to control for unobserved individual characteristics, their study has the limitation that it only focuses on the effect of the sum of three non-durables on happiness rather than other specific components of consumption expenditure.

We contribute to the literature on happiness in several important ways. First, we add to the paucity of studies that use panel data to estimate the effect of consumption on happiness. Panel data techniques allow us to control for individual unobserved heterogeneity, such as differences in ability and preferences arising from genetic disposition and family background by using fixed effects. As advocated in recent studies using panel data, the inclusion of individual fixed effects addresses fixed traits that produce endogeneity problems. Failure to account for personality traits means that much of the variation in happiness is potentially left unexplained. This is important given that 50 per cent to 80 per cent of variation in self-reported happiness could be explained by individual genes and personal traits (Graham, Eggers and Sukhtankar 2004, Lykken and Tellegen 1996).

Ferrier-i-Carbonell and Frijters (2004) standardize individual fixed effects by examining the change in happiness for each individual over time. They find that the determinants of happiness are sensitive to standardization for individual fixed effects in datasets that lack variables controlling for personality. Standardization tends to reduce the size of the coefficients on income because having a personality, which is conducive to higher happiness, is also associated with having a higher income. The same arguments are applicable to consumption, given evidence that personality traits are correlated with happiness and consumption (Cheng and Furnham 2003, Wong and Ahuvia 1998, Youn and Faber 2000, Eertmans, Victoir, Vansant and Van den Bergh, 2005).

Second, we examine not only the manner in which total consumption is related to happiness, but also how specific components of consumption expenditure are associated with happiness in China. This is important because not (only) total consumption, but the specific items that one consumes may matter for one's happiness. Findings from previous studies in developed economies suggest that consumption may affect happiness through several channels. First, increased consumption of certain goods, such as durable goods,

food and housing, may enhance individual happiness by alleviating material hardship or making life easier. Second, visible consumption, such as the purchase of jewellery and vehicles and spending on expensive vacations, could reflect one's social position, relative to a reference group. Such conspicuous consumption may increase individual happiness by increasing status (Kaus 2013). Third, several studies have found that certain types of consumption, such as spending on leisure activities and some charitable activities, may contribute to happiness through their effect on social relationships (Pugno 2009, Diener and Biswas-Diener 2002).

Our third contribution is that we examine the effect of relative consumption on happiness. The theory of relative deprivation suggests that people are more concerned about their relative standing (e.g. income and status) and may feel deprived if they do not fare as good as their peers (Ravallion and Lokshin 2010, Runciman 1966). There is increasing evidence that it is relative income, rather than absolute income, that has more effect on people's happiness (Ferrer-i-Carbonell 2005, Clark and Lelkes 2005, Dorn et al. 2007). Researchers have also observed the effect of relative income deprivation on happiness in urban China (Appleton and Song 2008, Knight and Gunatilaka 2010b). The behavioural economics literature suggests that comparisons are typically made with reference to those above an individual, rather than the whole group or those below. This is reflected in the evidence that upward comparisons are weighted more heavily than downward comparisons (Boyce, Brown and Moore 2010). Recent studies have found strong upward income comparison effects (Blanchflower and Oswald 2004, Ferrer-i-Carbonell 2005). In addition, findings from some previous studies show that income comparisons are not symmetric (Ferrer-i-Carbonell 2005, Oshio, Nozaki and Kobayashi 2011). We examine whether, and to what extent, relative consumption comparison, upward consumption comparison and asymmetric consumption comparison affect happiness.

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2   Data and descriptive statistics

The panel data used in this study is from the 2010 and 2012 waves of the CFPS, administered by the Institute of Social Science Survey at Peking University. The CFPS is a nationally representative panel that employs an implicit stratified, multi-stage, multi-level and probability proportional to size sampling method.[1] The 2010 baseline data covers 14,960 households and 33,600 individuals from 635 communities across 25 mainland provinces (excluding Inner Mongolia, Xinjiang, Tibet, Hainan, Ningxia, and Qinghai), representing about 95 per cent of the Chinese population (Xie, Hu and Zhang 2014). In 2012 the surveyed households were re-surveyed. The second wave covers 13,453 households and 34,447 individuals. The CFPS survey collects information on individuals, households and communities, such as demography, happiness, employment, consumption and income of households as well as environmental and socioeconomic characteristics of communities.

To measure happiness we use responses to the survey question: Are you satisfied with your life? Responses were measured on a five-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). This follows the standard approach in the literature (see eg. Alesina et al., 2004; Oshio et al., 2011). Table 1 presents happiness scores for the full sample and several subsamples for the panel. For both the full sample, and sub-samples, the mean happiness scores show a downward trend between 2010 and 2012. This result is consistent with findings from previous studies that happiness in China appears to have fallen in recent years, despite significant growth in income per capita (Brockmann et al. 2009). Most standard accounts have attributed the fall in happiness to increasing income inequality, rising urban insecurity, rapid urbanization and changing reference groups (Knight and Gunatilaka 2011). The mean score for the full sample decreased from 3.48 to 3.31. The decline in mean score for migrants is the largest, decreasing from 3.49 to 3.25. Females reported being happier than males in both waves. Rural residents, and rural-to-urban migrants, reported higher happiness scores than urban residents and urban locals, respectively, in the 2010 wave, but lower happiness scores in the 2012 wave. The t-test results suggest that there are significant differences in mean happiness scores between males and fe-

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[1] For a detailed description of the CFPS see Xie et al. (2014).

males, rural residents and urban residents as well as between urban locals and urban migrants in the two waves of the panel.[2]

Table 1   Summary statistics for happiness: full sample and sub-samples

	2010		2012	
	Mean	Std. Dev.	Mean	Std. Dev.
Full sample	3.48	1.04	3.31	1.05
Males	3.44	1.05	3.28	1.05
Females	3.51	1.03	3.34	1.06
Urban residents	3.46	1.04	3.34	1.04
Rural residents	3.49	1.04	3.29	1.07
Urban locals	3.48	1.04	3.31	1.05
Urban migrants	3.49	1.04	3.25	1.03

Notes: The consumption expenditure measures are in thousands of RMB at 2010 prices. Urban respondents who hold a local urban *hukou* (household registration) are categorized as urban locals. Urban respondents who dot hold a local urban *hukou* are categorized as urban migrants.

The key independent variable in this study is the measure of consumption expenditure. The CFPS collected information on eleven categories of consumption expenditure. Consumption is annual expenditure per capita measured in thousands of RMB and has been deflated by the consumer price index (CPI; base year 2010). The eleven categories of consumption that we examined in the study are: food, dress/clothing, housing, necessities, medical treatment and fitness, transportation and communication, education and entertainment, transfers, welfare, mortgage and other.

Table 2 reports consumption expenditure for the full sample and subsamples for the panel. There was a sharp increase in total consumption expenditure for both the full sample and sub-samples between 2010 and 2012. The statistics also show a similar increase in most specific components of consumption expenditure, except for medical treatment and fitness, transportation and communication and transfers. In terms of consumption structure, food was the largest consumption item, accounting for approximately 30 per cent of total consumption expenditure. Other big-ticket items included daily necessities, medical treatment and fitness, education and entertainment, and transportation and communication. Results of a MANOVA show that significant differences in consumption structure exist between rural and urban residents and urban locals and urban migrants in both waves, while the difference between males and females was only significant in the 2012 wave.

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[2] t-test results are available from the authors upon request.

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Table 2   Summary statistics for consumption: full sample and sub-samples

	Full sample		Males		Females		Urban residents		Rural residents		Urban locals		Urban migrants	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Panel A: 2010 CFPS														
Total consumption	9.03	11.23	9.05	11.08	9.01	11.38	12.11	13.84	6.38	7.40	8.46	9.94	15.60	19.82
Food	2.53	2.53	2.57	2.57	2.50	2.50	3.43	2.92	1.76	1.82	2.41	2.37	3.91	3.74
Dress	0.34	0.86	0.33	0.61	0.34	1.05	0.50	1.21	0.20	0.30	0.31	0.80	0.66	1.33
Housing	0.49	1.93	0.48	2.00	0.49	1.87	0.76	2.49	0.24	1.22	0.40	1.67	1.52	3.72
Necessities	0.82	2.11	0.82	2.06	0.82	2.15	1.15	2.45	0.53	1.71	0.76	2.02	1.52	2.86
Medical treatment and fitness	1.00	2.98	1.00	3.18	1.00	2.79	1.19	3.40	0.84	2.55	0.99	2.94	1.09	3.45
Transportation and communication	0.93	1.79	0.95	1.78	0.91	1.79	1.30	2.30	0.61	1.08	0.86	1.60	1.77	3.10
Education and entertainment	0.92	3.17	0.90	2.58	0.94	3.64	1.25	4.32	0.64	1.57	0.85	2.31	1.72	7.98
Transfer	1.42	4.06	1.42	4.05	1.42	4.06	1.74	5.00	1.15	3.01	1.34	3.83	2.33	6.08
Welfare	0.13	0.91	0.13	0.90	0.14	0.93	0.23	1.25	0.05	0.43	0.12	0.84	0.27	1.50
Mortgage	0.18	1.93	0.17	1.66	0.19	2.16	0.34	2.66	0.03	0.91	0.14	1.80	0.61	3.03
Other	0.24	2.63	0.26	2.80	0.22	2.47	0.22	1.98	0.26	3.09	0.23	2.58	0.34	3.17
MANOVA test			Wilks's lambda=0.9994, p=0.1053				Wilks's lambda=0.8734, p=0.0000				Wilks's lambda=0.9508, p=0.0000			
Panel B: 2012 CFPS														
Total consumption	10.71	17.17	10.61	16.98	10.82	17.35	14.78	22.79	7.69	10.32	10.31	16.09	18.89	30.12
Food	3.51	3.53	3.52	3.51	3.50	3.54	4.42	4.08	2.83	2.86	3.48	3.47	4.46	4.32
Dress	0.47	0.94	0.46	0.83	0.49	1.03	0.65	1.26	0.34	0.56	0.45	0.85	0.84	1.85

Housing	0.57	0.80	0.57	0.83	0.58	0.78	0.84	0.99	0.38	0.55	0.56	0.72	0.99	1.71
Necessities	1.58	8.62	1.58	8.70	1.58	8.55	2.35	12.37	1.01	3.91	1.51	8.35	3.10	12.94
Medical treatment and fitness	0.96	3.02	0.96	3.10	0.96	2.93	1.10	3.31	0.86	2.77	0.97	3.05	0.97	2.41
Transportation and communication	0.77	1.17	0.77	1.18	0.76	1.16	1.05	1.46	0.56	0.84	0.74	1.13	1.25	1.80
Education and entertainment	0.93	2.59	0.90	2.52	0.97	2.65	1.31	3.23	0.65	1.93	0.89	2.44	1.78	4.59
Transfer	0.34	1.91	0.33	1.96	0.35	1.85	0.53	2.62	0.20	1.08	0.29	1.52	1.06	4.98
Welfare	0.32	1.48	0.32	1.45	0.33	1.52	0.53	2.10	0.17	0.72	0.31	1.47	0.60	1.74
Mortgage	0.81	9.23	0.78	8.94	0.84	9.51	1.42	12.29	0.35	5.98	0.67	8.44	3.19	18.12
Other	0.45	2.59	0.44	2.55	0.46	2.63	0.58	3.10	0.35	2.12	0.44	2.58	0.65	2.80
MANOVA test	Wilks's lambda=0.9994, p=0.0327				Wilks's lambda=0.8862, p=0.0000				Wilks's lambda=0.9748, p=0.0000					

Notes: All consumption expenditure measures are in thousands of RMB at 2010 prices;

Categories of consumption expenditure are defined as follows:

Food: food (including self-produced and consumed food and eating out), tobacco and alcohol;

Dress: clothing, shoes, hats and gloves;

Housing: water, electricity, fuel, heating, property management and rent;

Necessities, durables and household services: services provided by housekeepers, hourly labourer and servants; daily commodities and necessities; car, other transportation and communication tools, maintenance and repair, purchase of gadgets/computers/other home-office related items, furniture and other durable goods purchases;

Medical treatment and fitness: out-of-pocket medical expenditure (i.e. excluding reimbursable component from private/social insurance), and the expenditure on fitness, including bodybuilding, physical exercise, health-related apparatus and products;

Transportation and communication: communication such as phone, internet and post and local transportation;

Education and entertainment: books, newspapers, magazines, CD/VCD/DVD, and going to cinemas and bars; the expenditure on tourism and education;

Transfer: personal tax (excluding income tax) and miscellaneous fees paid to the government; donations; financial support and donations to non-resident relatives;

Welfare: premiums for commercial medical insurance, commercial property insurance, and pensions;

Mortgage: mortgage and home loan; Others: lottery, cosmetic services and so on.

Following existing studies on the effect of relative income on happiness, we construct several measures to compare relative consumption, in order to examine whether, and to what extent, happiness is affected by people's aspirations, as set by their reference groups.

There are a number of ways to define the reference group. Most of the extensive literature on the effects of income comparisons has been based on the cell average. This entails calculating comparison income as the cell average of income by region, gender, age or education (Oshio et al. 2011, Huang, Wu and Deng 2015, Clark et al. 2008). A parallel literature has defined the individual's own past income, or expected future income, as a reference point to examine the effects of income adaptation and aspiration on the individual's happiness, in an attempt to explain the Easterlin paradox (Di Tella, Haisken-De New and MacCulloch 2010, Paul and Guilbert 2013).

Since there is evidence that social comparisons are localized in both space and time (Knight and Gunatilaka 2010b, Ferrer-i-Carbonell 2005), we distinguish between internal and external reference points in defining the reference group. With respect to external reference points, Knight, Song and Gunatilaka (2009) found that in China, for almost 70 per cent of respondents their main reference group was defined as being within their own village. We, therefore, define reference groups at the community level and rural county/urban district level (hereafter 'county level' for short), separately.

We construct a further reference group along three dimensions: age, education and gender. We divide education into three categories according to the number of years of education: primary school and below (0–9 years), junior or senior high school (10–15 years) and college or above (16 years or more). We divide age into six categories: younger than 20, 20–29, 30–39, 40–49, 50–59, and 60 or above. Pulling this together, this means that we have thirty-six groups in total for each year (2×3×6=36). In terms of an internal reference point, we treat an individual's consumption in 2010 as their reference point. Similar to existing studies, we assume that the reference group is exogenous.

3   Econometric method

To examine the relationship between one's consumption and happiness we use the following fixed-effect panel regression model, which allows us to eliminate the influence of unobserved time-invariant individual characteristics (Clark, D'ambrosio and Ghislandi 2015).

$$Happiness_{it} = \alpha + \beta_1 Consumption_{it} + \beta_2 P_{it} + \beta_3 E_{it} + \beta_4 A_{it} + \beta_5 H_{it} + \beta_6 C_{it} + \beta_7 R_{it} + \mu_i + \nu_t + \varepsilon_{it}$$

where subscript i denotes the individual and t represents the year. $Happiness_{it}$ is happiness of the ith respondent in year t. $Consumption_{it}$ denotes total consumption expenditure, relative consumption or the specific component of consumption expenditure, depending on the specification. We define relative consumption as the ratio of an individual's own consumption expenditure to average reference group consumption expenditure. We also include a series of controls that the existing literature suggests are correlated with happiness (for a detailed review see, Dolan et al. 2008). These potential correlates include personal characteristics (P_{it}), employment characteristics (E_{it}), attitudes and beliefs towards self/others/life and the government (A_{it}), housing characteristics (H_{it}), community characteristics (C_{it}) and region of residence (R_{it}). Of the remaining variables, μ_i is an unobserved individual fixed effect; ν_t is a year fixed effect; and ε_{it} is an unobserved white noise disturbance.

We utilize the Yitzhaki (1979) index to calculate relative deprivation of each respondent within reference groups. This index is based on Runciman's (1966) theory of relative deprivation. Relative deprivation for each individual is calculated as the aggregated shortfall in consumption between the individual and those with higher consumption within the corresponding reference group.

$$Yitzhaki\ index_i = \frac{1}{N} \sum_j (consumption_j - consumption_i) \quad \forall consumption_j > consumption_i$$

where individuals i and j are in the same reference group, and j has higher consumption than i. N is the total number of individuals in that reference group. This index is equal to zero if the individual has the highest consumption within the reference group, while for those with the lowest consumption expenditure among their peers, it is close to the difference between the individual's own consumption and average reference group consumption. As such, the Yitzhaki index can be regarded as an upward looking index of deprivation. To test whether there is an asymmetric response to consumption comparisons with others, we adopt the method proposed by Ferrer-i-Carbonell (2005), which constructs two new variables, denoted as "richer" and "poorer":

If $consumption_i > consumption_r$ $richer = consumption_i - consumption_r$; Otherwise $richer = 0$

If $consumption_i < consumption_r$ $poorer = consumption_i - consumption_r$; Otherwise $poorer = 0$

where $consumption_r$ is the average consumption of individual i's reference group.

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One methodological issue is whether to treat the happiness measure as cardinal or ordinal. Ferrer-i-Carbonell and Frijters (2004) suggest that the significance, and sign, of the coefficients are not sensitive to whether one uses ordinary least squares (OLS), that treats happiness variables as cardinal, or ordered probit/logit methods that treats them as ordinal. On theoretical grounds, Ng (2008) advocates treating happiness measures as cardinal. In addition, most existing studies have employed OLS to estimate happiness equations in China, because the OLS results are more intuitive and easier to interpret (Knight and Gunatilaka 2010a, Appleton and Song 2008). To assist comparability, we also treat the happiness measure as cardinal in the main results. Nevertheless, we also present results in the robustness checks in which we treat happiness as being ordinal. We find that treating happiness as ordinal makes no qualitative difference to the main findings.

4   Empirical results

4.1   Total consumption expenditure and happiness

We first examine the relationship between total consumption expenditure and happiness. Table 3 presents the results of pooled OLS and fixed effects regressions. Both results show that total consumption expenditure has a significant and positive effect on happiness, after controlling for other factors potentially correlated with happiness. This result is consistent with Noll and Weick's (2015) panel findings for Germany. In the pooled regressions, the estimated coefficient on total consumption indicates that an increase by one standard deviation raises the happiness score by 0.0197 points. The magnitude of the consumption coefficient is relatively small compared to that of most other control variables in the specification. For example, the coefficient on health status is 0.0714, suggesting the effect on happiness of a one step improvement in health status is similar to that of additional consumption expenditure of 51,000 RMB. The coefficient on daily working hours is –0.0072, suggesting that an increase in consumption expenditure of 5,000 RMB would be required to offset the negative impact on happiness of working an additional hour per day.

As expected, in the fixed effect within-individual estimation the magnitude on the consumption coefficient is reduced slightly compared with that in pooled OLS, although it continues to be significant at the 1 per cent level. This is consistent with previous research that has found positive personality traits bias the income-happiness relationship (Ferrer-i-

Carbonell and Frijters 2004, Powdthavee 2010). When testing the OLS model versus the fixed effects model using the Hausman test, the results suggest that the null hypothesis that the differences in coefficients are not systematic can be rejected.[3] Thus, one can conclude that the fixed effects model provides more reliable estimates when examining the effect of consumption, and other factors that vary over time, on happiness in the absence of information regarding individual unobserved heterogeneity.

Table 3   Effects of total consumption expenditure on happiness

	Pooled OLS				Fixed effects			
Total consumption	0.0014***	(5.45)	0.0027***	(6.12)	0.0013***	(2.78)	0.0015*	(1.86)
Total consumption^2			–0.0000***	(–2.87)			–0.0000	(–0.36)
Other variables	Yes		Yes		Yes		Yes	
Constant	1.9012***	(38.37)	1.8904***	(38.14)	3.3594***	(7.36)	3.3630***	(7.36)
N	61009		61009		61009		61009	

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01; t-values in parenthesis;

All specifications control for age (year), age squared, marital status (unmarried, married and other), schooling (years), hukou status (urban or rural), holding local hukou (yes or no), health status (scale: 1=very poor; 5=very good), health status compared to one year ago (better, no change or worse), employment status (employed or retired), industry of employment (manufacturing, construction, business and services, public management, education, science, culture and health care, agriculture, or others), occupation (manager, technician and clerk, service worker, production worker, or others), working hours per day, number of welfare entitlements, ownership (own, rent, or others), type (apartment, bungalow, low-rise house, or others) and building area of (square meters) of house, owning any other house (yes or no), self-assessed level of income at the local level (scale: 1=very low; 5=very high), self-assessed level of social status at the local level (scale: 1=very low; 5=very high), confidence in future (scale: 1=very low; 5=very high), number of unfair treatment experienced, evaluation on the performance of the county/district government last year (scale: 1=very good; 5=very poor) , type of community (residential or village community), economic condition of the community (scale: 1=very poor; 7=very rich), socioeconomic homogeneity of the members in the community (scale: 1=very low; 7=very high), spaciousness of the community (scale: 1=very crowded; 7=spacious), location of the community (city, town, village or suburb), time needed to get to the nearest business center (minutes), and region (east, west or central regions);

Results for other variables are available from the authors.

We also test for a non-linear relationship between consumption and happiness by adding the square of the consumption variable. The results are also presented in Table 3. If there is diminishing marginal utility of consumption, it follows that additional consumption contributes less to happiness as consumption expenditure rises. The findings indicate that the

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[3] The results of Hausman test are: χ^2 (39) =325.8, p=0.0000.

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coefficient on the squared term is significant and negative in the pooled OLS regression. In the pooled OLS regression, happiness peaks when consumption expenditure is very high – approximately 204,000 RMB. However, the square of consumption is not significantly different from zero in the fixed effects regression.

Earlier studies suggest that income and net wealth are most valued at very low income levels (Knight and Gunatilaka 2010b). For a given level of income, an increase in consumption entails a net loss of wealth, which is likely to reduce happiness (Headey et al. 2008). We examine the effect of consumption, and the consumption-income ratio, on an individual's happiness in the lowest, medium and highest household income per capita terciles for both communities and counties. As shown in Table 4, at the community level, consumption expenditure has a significant positive effect on happiness in the lowest income per capita tercile, while the effect of the consumption-income ratio is significantly negative, which is consistent with findings from previous studies. This implies that consumption may not be affecting happiness if a person has reached a certain point in the higher terciles in the income distribution. The size of the coefficient on consumption is significantly greater than the coefficient on the consumption-income ratio, which strongly suggests that the overall effect of consumption on happiness is positive, although an increase in the proportion of consumption in income at a given income level could significantly reduce happiness. At the county level, only the effect of consumption expenditure on happiness in the lowest income per capita tercile is significant.

Table 4   Effects of total consumption and consumption-income ratio on happiness

	Lowest		Medium		Highest	
Panel A: Community level						
Total consumption	0.0030***	(2.61)	–0.0020	(–0.98)	0.0006	(0.67)
Consumption-income ratio	–0.0003**	(–2.18)	–0.0000	(–0.00)	0.0287	(1.28)
Panel B: County level						
Total consumption	0.0023*	(1.70)	0.0024	(1.40)	0.0005	(0.58)
Consumption-income ratio	–0.0000	(–0.55)	–0.0127	(–0.74)	0.0071	(0.30)

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; t-values in parenthesis;
Results for total consumption and consumption-income ratio in each income level are obtained separately;
All specifications control for a full set of other variables as per the notes to Table 3;
Results for other variables are available from the authors.

4.2   Consumption components, sub-groups and happiness

Table 5 presents the estimated effects of total consumption, and various components of consumption expenditure, on happiness for the whole sample and various subsamples based on gender, *hukou* status and place of residence. Our findings suggest that total consumption expenditure is positively related to happiness for males, urban residents and urban locals, while its effects on happiness of other groups are not significant. This implies that there are widespread differences in the rate, and degree, of adaptation to consumption expenditure across groups, consistent with previous findings for urban China and other countries (Knight and Gunatilaka 2010b, Di Tella et al. 2010).

Table 5   Effects of various components of consumption expenditure on happiness

	Full sample	Males	Females	Urban residents	Rural residents	Urban locals	Urban migrants
Total consumption		0.0019***	0.0007	0.0013**	0.0007	0.0012**	0.0001
		(2.94)	(1.10)	(2.38)	(0.71)	(2.44)	(0.11)
Food	0.0029	0.0044	0.0018	0.0040	0.0017	0.0026	0.0051
	(1.41)	(1.47)	(0.62)	(1.44)	(0.50)	(1.15)	(0.65)
Dress	0.0219**	0.0473***	0.0075	0.0176*	0.0217	0.0441***	–0.0227
	(2.34)	(2.91)	(0.82)	(1.71)	(1.05)	(3.57)	(–1.30)
Housing	–0.0011	–0.0019	0.0003	–0.0031	0.0020	–0.0011	–0.0121
	(–0.41)	(–0.53)	(0.07)	(–0.91)	(0.34)	(–0.37)	(–1.20)
Necessities	–0.0007	–0.0005	–0.0009	–0.0010	–0.0013	–0.0017*	0.0013
	(–0.87)	(–0.51)	(–0.73)	(–1.18)	(–0.60)	(–1.89)	(0.77)
Medical treatment and fitness	–0.0015	–0.0006	–0.0025	0.0032	–0.0074**	–0.0028	0.0177
	(–0.83)	(–0.28)	(–0.85)	(1.52)	(–2.38)	(–1.43)	(1.24)
Transportation and communication	0.0171***	0.0209***	0.0145**	0.0185***	0.0163*	0.0192***	–0.0071
	(3.62)	(3.10)	(2.23)	(3.29)	(1.83)	(3.68)	(–0.30)
Education and entertainment	0.0002	0.0008	–0.0008	–0.0000	0.0006	0.0000	–0.0032
	(0.10)	(0.27)	(–0.25)	(–0.02)	(0.18)	(0.00)	(–0.54)
Transfers	0.0040*	0.0043	0.0038	0.0018	0.0081**	0.0050**	–0.0019
	(1.95)	(1.48)	(1.33)	(0.76)	(2.05)	(2.27)	(–0.34)
Welfare	0.0029	0.0198**	–0.0047	–0.0029	0.0247	0.0023	–0.0143
	(0.56)	(2.22)	(–1.09)	(–0.69)	(1.44)	(0.43)	(–0.94)
Mortgage	0.0009	0.0005	0.0011	0.0011	–0.0003	0.0009	0.0013
	(1.24)	(0.55)	(1.11)	(1.45)	(–0.21)	(1.06)	(0.97)
Other	0.0012	0.0036	–0.0020	0.0020	–0.0005	0.0019	–0.0022
	(0.70)	(1.62)	(–0.91)	(0.86)	(–0.22)	(1.06)	(–0.45)
N	61009	29715	31294	27548	33461	57193	3816

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; *t*-values in parenthesis;
Results for total consumption and consumption components are obtained separately;
All specifications control for a full set of other variables as per the notes to Table 3;
Results for other variables are available from the authors.

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However, not all categories of consumption expenditure are positively related to happiness. This result is consistent with findings from previous studies (DeLeire and Kalil, 2010; Noll and Weick, 2015). Spending more on clothing has a significant positive relationship with happiness for the whole sample, males, urban residents and urban locals. This finding is consistent with previous studies that have also found that spending on clothing is positively related to happiness (Dumludag, 2015; Noll and Weick, 2015; Perez-Truglia, 2013). The results imply that a one standard deviation change in spending on clothing accounts for 0.0189 percent of a standard deviation change in happiness for the full sample, 0.0332 percent of a standard deviation change in happiness for males, 0.0209 percent of a standard deviation change in happiness for urban residents and 0.0350 percent of a standard deviation change in happiness for urban locals. A potential explanation for this result is that clothing consumption is very visible and may have a positive effect on happiness through signaling wealth and other status attributes (Noll and Weick, 2015; Perez-Truglia, 2013). The purchase of consumption goods, such as designer labels, which could signal a person's relative status, have been found to be positively correlated with happiness (Dynan and Ravina 2007).

Spending on transportation and communication has a significant and positive effect on happiness of both the full sample and all sub-samples, except for urban migrants. A one standard deviation increase raises the happiness score by 0.0244 points for the full sample, by 0.0298 points for males, by 0.0208 points for females, by 0.0343 points for urban residents, by 0.0148 points for rural residents and by 0.0251 points for urban locals. Consumption of transportation and communication could be proxying social connectedness and reflect higher participation in social activities with relatives and friends. The results reaffirm findings from previous studies that consumption is associated, in part, with higher happiness through its effect on social ties (DeLeire and Kalil 2010). A large body of evidence suggests that people with more social relationships are happier (Haller and Hadler 2006, Frey 2008). The effect of transportation and communication expenditure on migrants' happiness is negative, but not significant. One plausible explanation is that for migrants increased transportation and communication spending reflects greater distance between their home and host communities. Increased distance could reduce the size of social networks and support from family and friends on the one hand, and exacerbate differences in culture, society and language, which aggravate the psychological burden on migrants, on the other (Poncet 2006, Chen 2011). Consequently, the potential positive im-

pact of transportation and communication expenditure on happiness may be offset by a weakening of social bonds and higher psychological costs.

Spending on transfers is positively related to happiness for the full sample, rural residents and urban locals. A one standard deviation increase raises happiness by 0.0121 points for the full sample, by 0.0172 points for rural residents and by 0.0138 points for urban locals. Transfer expenditure includes taxation and several types of donations. Some have argued that higher taxation could be used to fund public services, which may enhance individual happiness (Dolan et al. 2008). Moreover, higher tax payments could reduce income inequality, which has been found to have a significantly negative effect on happiness, both in China and many other countries (Oshio and Kobayashi 2010, Alesina, Di Tella and MacCulloch 2004, Jiang, Lu and Sato 2012). Several studies have found that making transfers to one's children, relatives and friends as well as making charitable donations make people happier (Dunn, Aknin and Norton 2008, Dunn, Aknin and Norton 2014).

A positive relationship exists between welfare expenditure (including insurance premiums) and happiness among males. A one standard deviation increase in expenditure on welfare raises the happiness score for males by 0.023 points. Spending on insurance could enhance people's sense of security, which are associated with higher happiness levels (Banerjee and Duflo 2007, Graham and Pettinato 2004). Our results are also compatible with findings from previous studies that having access to health insurance makes people happier (Keng and Wu 2014, Graham 2008). The results of F-tests suggest that there are structural differences in the determinants of happiness between males and females, rural residence and urban residents, as well as urban locals and migrants.[4]

4.3   Relative consumption and happiness

In this section, we examine the effect of consumption comparisons on happiness. We consider both comparisons with others in the relevant reference group (social comparisons) and comparisons with one's own consumption in the past (adaptation). We also examine if consumption has an asymmetric effect on happiness above and below the reference position. In terms of social comparisons, the results in Panel A of Table 6 show that comparisons with an individual's own consumption and average consumption in their coun-

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[4] F-test results are available from the authors upon request.

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ty/community are all significantly associated with the individual's perceived happiness. Our results confirm that the relative consumption hypothesis holds at both the county and community levels. A one standard deviation increase in relative consumption is associated with almost a 0.015 points increase in the happiness score.

Table 6   Effects of relative consumption on happiness

	County		Community		Gender, age and education	
Panel A: External reference points						
Ratio mean	0.0140**	(2.32)	0.0141*	(1.93)	0.0139***	(2.75)
Yitzhaki index	0.0055	(1.62)	0.0028*	(1.78)	− 0.0002	(−0.07)
Richer	0.0015***	(2.99)	0.0014***	(2.67)	0.0011**	(2.19)
Poorer	− 0.0035*	(−1.80)	− 0.0014	(−1.62)	0.0025	(1.19)
Panel B: Internal reference points						
Ratio differ	0.0000	(0.21)				
Richer	0.0000	(0.12)				
Poorer	0.0016	(1.54)				

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; t-values in parenthesis;

Recent evidence suggests that social comparisons tend to be upward looking (Ferrer-i-Carbonell and Frijters 2004, Oshio et al. 2011). To test whether this is the case with our sample, we replace the relative consumption term with the Yitzhaki index, which is an upward-looking index of deprivation. It may be that respondents do not care so much about how they fare compared with their average neighbour, but rather how they fare compared with those with the highest consumption expenditure in their county or community. We find that the coefficient on the Yitzhaki index is significant and positive at the community level, while it is insignificant at the county level. This suggests that comparisons with high consumption individuals in the same community, rather than in the same county, have a significant effect on happiness. This result corroborates findings in earlier studies that people define their reference group in terms of local communities (Knight et al. 2009).

To test whether, and to what extent, the hypothesis that comparison effects are asymmetric holds in terms of consumption, we replace the relative consumption term with two variables, richer and poorer, which are defined in Section 3. The results show that at the county level, the coefficient on richer is significant and positive and that on poorer is significant and negative. The absolute magnitude of the coefficient on poorer is larger than

that of the coefficient on richer, suggesting that the happiness of individuals who consume less than the reference group average is more sensitive than those who consume more than the reference group average to relative consumption. This finding supports the asymmetry of comparisons hypothesis postulated by Duesenberry (1949). However, at the community level, only richer consumers are sensitive to relative consumption, while poorer consumers are not. This result is consistent with Oshio et al.'s (2011) findings on asymmetric responses to income comparisons with others in Korea and the United States.

One of the difficulties with examining the relationship between relative income and an individual's happiness is to correctly identify the reference group, especially when people move frequently in their lifetimes and reside in high population-density areas (Clark et al. 2008). To check the robustness of our results, we construct another reference group based on gender, age and education and re-estimate the effect of various consumption comparisons on individual happiness. Our results show that consumption comparison within the reference group has a significant, and positive, effect on an individual's happiness, which further confirms the existence of relative consumption effects in China. A one standard deviation increase in relative consumption increases an individual's happiness score by 0.0175 points. However, the results for the Yitzhaki index suggest that consumption comparisons are not upward looking and individuals do not experience relative deprivation within the reference group. We find that only individuals who consume more than the reference group's average are sensitive to consumption comparisons, while those who consume less are not.

Besides external reference points, an increasing body of literature has examined internal reference points, specifically the individual's own past income or income aspirations for the future (see, for example, Di Tella et al. 2010, Oswald and Powdthavee 2008, Wolbring, Keuschnigg and Negele 2013). We use the respondents' past consumption as their reference point to examine the effect of consumption adaptation, and aspiration, on an individual's happiness. The results in Panel B of Table 6 show that comparison with one's past consumption has no significant effect on an individual's happiness. Moreover, neither individuals who consume more, nor those who consume less, than in the past are sensitive to relative consumption. One plausible explanation for these results is that an individual's consumption expenditure is fairly stable over time and does not fluctuate as much as income. With consumption adaptation, people adjust to their new circumstances, so that changes in consumption have only transient effects (Clark et al. 2008). This conjecture has

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been supported by the findings of some previous studies that approximately 60 percent of the income effect at the individual level disappears over the following two-four years due to adaptation (Di Tella et al. 2010). Furthermore, it has been found that there is greater adaptation to rises in income than to falls in income (Burchardt 2005). Recent research on the income-happiness paradox suggests that if aspirations rise together with income, the effect of rising income on happiness could be muted (Easterlin 2001, Knight and Gunatilaka 2012). Based on the same idea, people's aspirations could also change, along with consumption expenditure, such that, in the long run, they may offset the favourable, or non-favourable, effect of consumption on an individual's happiness.

4.4   Treating happiness as ordinal

We check the robustness of our findings by treating happiness as ordinal instead of cardinal. The fixed effects estimator for the ordered logit model is based on conditional logit estimation of a dichotomized response (Chamberlain 1980). Winkelmann and Winkelmann (1998) suggest a way of collapsing the ordered categorical responses into a single dichotomous variable at a constant value for all individuals and use Chamberlain's estimator for fixed effects binary logit models (hereafter WW). Following this approach, we dichotomize the five-point happiness score at value four. This cutoff results in a distribution in which the binary dependent variable is approximately normally distributed with around 50 per cent of the responses being equal to, or greater than, four.

Another approach, proposed by Das and Van Soest (1999), is to estimate fixed effects logits with every possible dichotomizing cutoff point and then combine the resulting estimates by the minimum distance method (hereafter DvS). Baetschmann, Staub and Winkelmann (2014) have recently suggested an alternative to the DvS estimator which avoids the problem of small sample sizes associated with some cutoff values. The Blow-Up and Cluster (BUC) estimator uses all variation of the ordinal response variable by expanding the data set to accommodate all possible binary recoding options of the ordered dependent variable. Although not asymptotically efficient, this estimator has the advantage that it is simple to implement and its maximization process is stable.

As a robustness check on the OLS results, we re-estimate the specifications in Table 4 with these three methods (WW, DvS and BUC). For comparison we also ran the pooled ordered logit model (pooled OL) on the same sample as the fixed effects models.

The results are reported in Table 7. Consistent with the results obtained in Table 4, estimates based on pooled OL, WW, DvS and BUC indicate a significant, and positive, relationship between consumption expenditure and an individual's happiness. These results are consistent with previous findings that it makes no qualitative differences to the significance, and sign, of the coefficients whether one treats happiness responses as cardinal or ordinal in the happiness equation (Ferrer-i-Carbonell and Frijters 2004).

Table 7   Treating happiness as ordinal

	Pooled OL		WW		DvS		BUC	
Total consumption	0.0035***	(6.17)	0.0034**	(2.01)	0.0059***	(4.77)	0.0031**	(2.42)
Observations/individuals	61009		17346		14104		40472	
Pseudo-log-likelihood	–74286.008		–4474.0854		–		–10560.279	

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; t-values in parenthesis;
"Observations" in Pooled OL, WW and BUC denote the number of person-years in the estimation sample;
"Individuals" in DvS denote the number of unique people in the estimation sample;
All specifications control for a full set of other variables as per the notes to Table 3;
Results for other variables are available from the authors.

5   Conclusion

We have examined the relationship between total consumption, and its components, and happiness in China using panel data. We have also examined how consumption, relative to internal and external references, affects an individual's happiness. We find that total consumption expenditure has a positive effect on happiness. This finding holds irrespective of whether happiness is treated as being cardinal or ordinal. We find that the components of consumption expenditure have differential effects on happiness. Specifically, expenditure on clothing, transport and communication, transfers and welfare (in the case of men) each have positive effects on happiness. The implication is that what we spend our money on has important implications for happiness levels. We find that relative consumption matters for happiness, irrespective of whether the reference group is defined at the community or county levels or constructed based on age, education and gender. However, the extent to which comparison effects are upward looking, or asymmetric, depend on how the reference group is defined and comparison with one's past consumption has no effect on happiness.

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There are several directions for future research. First, there are very few studies examining the relationship between consumption and happiness and even fewer using panel data. There is a need for more panel-based studies for both developed and developing countries. Second, while we examined the effect of different components of consumption expenditure on happiness, the dataset is restricted to 11 categories of consumption. Future studies could examine more detailed consumption categories that would allow for a more nuanced interpretation of the results. Third, more research is needed to examine why specific categories of consumption have larger effects on consumption. The role that conspicuous consumption plays in expenditure on clothing is one example. But, to really address this issue information on clothing expenditure at a finer level of detail is needed – for example expenditure on designer brands versus non-designer clothing and which designer brands. Fourth, more generally, research is needed on how luxury consumption affects happiness and how luxury consumption and materialism change over time (see Hudders and Pandelaere, 2012). Fifth, we have used objective reference points, based on locale and demographic characteristics of the respondents. Future research could use subjective reference groups in which the respondent selects his/her own reference points (see eg. Knight et al., 2009 for a study that does this for income). Finally, more research is needed examining the reverse question: To what extent does happiness influence consumption (and savings) behaviour? The literature on this issue is limited (see Guven, 2012). Further research on this issue would assist to further untangle the relationship between (different components) of consumption and happiness across countries and over time.

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