

Will the “nouveau-riche” (new-rich) waste more food? Evidence from China

Will the
“nouveau-
riche” waste
more food

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Abstract

Purpose – This study aims to test the compensatory consumption theory with the explicit hypothesis that China’s new-rich tend to waste relatively more food.

Design/methodology/approach – In this study, the authors use Heckman two-step probit model to empirically investigate the new-rich consumption behavior related to food waste.

Findings – The results show that new-rich is associated with restaurant leftovers and less likely to take them home, which supports the compensatory consumption hypothesis.

Practical implications – Understanding the empirical evidence supporting compensatory consumption theory may improve forecasts, which feed into early warning systems for food insecurity. And it also avoids unreasonable food policies.

Originality/value – This research is a first attempt to place food waste in a compensatory-consumption perspective, which sheds light on a new theory for explaining increasing food waste in developing countries.

Keywords China, Compensatory consumption, Food waste, New money, New-rich

Paper type Research paper

1. Introduction

Food waste accounts for 17% of global total food production, posing a serious threat to food security and the environment (Bush and Martiniello, 2017). In 2019, approximately 931 million tons of food were wasted, 26% of which was from food service (UNEP, 2021). The

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relatively low food cost in consumer expenditures for mid to high income households results in excessive food purchases. This extra demand drives up prices, which is a serious threat to low-income households whose food cost is a large proportion of their income.

Developing countries especially large emerging economies are facing an increasing food-waste challenge over the past 2 decades (Masters *et al.*, 2016). UNEP (2021) reports China and India lead in food waste with 91.6 and 68.8 million tons per year. China is the world's fastest-growing economy comprising an expanding population of nouveau-riche (new-rich) citizens. This economic growth precipitates changing consumption patterns with the new-rich leading to food waste, as shown that food waste tends to rise with an expanding middle class (WRAP, 2015). China wastes more food than the US even on a per capita basis, and its restaurant food waste level is close to the average level of Nordic countries (Wang *et al.*, 2017).

Most food waste occurs during the consumption stage and is concentrated at the household level (Quested *et al.*, 2013; Stancu *et al.*, 2016). A contributor to China's high level of food waste may be the conspicuous consumption of its new-rich, where consumers derive their utilities from their relative consumption instead of absolute consumption (Sun *et al.*, 2020). Conspicuous consumption refers to the acquisition of higher status and recognition through consumption (Barauskaitė *et al.*, 2018). In the popular press, China's new-rich are anecdotally reported to flaunt wealth by ordering excess restaurant food (China National Radio (CNR), 2013). The compensatory consumption theory (CCT) provides the theoretical basis for explaining the conspicuous consumption of the "new-rich", while CCT is an under-explored research area in consumer behavior (Woodruffe and Elliott, 2005).

Compensatory consumption theory states that past suffering from a lack of a commodity could be mitigated by its current consumption and/or by the current consumption of substitutive commodities (Grunert, 1993; Woodruffe and Elliott, 2005). In terms of food waste, the suffering from food insecurity in the past may be compensated by the current excessive purchasing of food resulting in waste. The concept of compensatory behavior was described by Jahoda *et al.* (1933) and connected to consumption by Caplovitz (1963). It has been related to compulsive buying (O'Guinn and Faber, 1989), cultural and social pressure in gift giving (Brown *et al.*, 2011), self-gift giving (Luomala, 1998), compensatory eating (Grunert, 1993) and conspicuous consumption (Mason, 1981). Existing research points to the presence of conspicuous consumption in food consumption (Barauskaitė *et al.*, 2018), but no studies employ CCT to explore the food waste behavior of the new-rich.

The goal of this study is to develop an analytical model and empirically test CCT with the explicit hypothesis that China's new-rich tend to waste relatively more food. The new-rich are distinguished based on their childhood and current economic status.

2. Literature review

Currently, consumer food-waste research mainly rests on behavioral theories (Schanes *et al.*, 2018; Werf *et al.*, 2020; Wang, 2022; Ananda, 2023; Chen *et al.*, 2023), including the Theory of Planned Behavior (Ajzen, 1991) and Behavioral Reasoning Theory (Sparks *et al.*, 1992). These studies suggest that human behaviors including food waste behaviors are influenced by attitudes (Sparks *et al.*, 1992; Talwar *et al.*, 2023; Nguyen, 2023), subjective norms (Ajzen, 1991; Lorenz *et al.*, 2017) and values (Sharma *et al.*, 2021). Consistent with these theories that individuals' attitudes are influential precursors that first predict their behavioral intention and later their actual behavior, it has been found that attitudes toward food leftovers positively influence food waste and the act of saving leftovers (Stancu *et al.*, 2016). Such behavior theory based studies have been widely found for household food waste, but rarely for dining out food waste (Graham *et al.*, 2014; Talwar *et al.*, 2023). Dining out causes more food waste than dining at home (Wang *et al.*, 2017), but consumers can reduce dining-out food waste by taking leftover

food home (Liao *et al.*, 2018; Talwar *et al.*, 2023). However, few consumers do this (Bloom, 2010) unless staff prompted by staff (Hamerman, 2018). Taking leftovers continues to be underexplored as a viable food waste recovery strategy (Filimonau *et al.*, 2020; Talwar *et al.*, 2023).

Consumers' perceptions of restaurant food are important factors in food waste from dining out (McAdams, 2019; Talwar *et al.*, 2023), thus restaurant food pricing (Liao *et al.*, 2022), discounts (Xu *et al.*, 2020), and plate size (Reynolds *et al.*, 2019) can affect consumers' dining out food waste. Moreover, food waste phenomena from the industry's perspective are also studied, such as the organizational structure of the food service (Heikkilä *et al.*, 2016), food waste attitudes of restaurant staff (Okumus, 2020; Goh and Jie, 2019) and strategies for restaurant managers to reduce food waste (Sakaguchi *et al.*, 2018).

Previously, the consumer food-waste problem was mainly an issue in developed countries (Lorenz *et al.*, 2017). Due to the role of social and cultural drivers in food waste, there exist differences in food waste behavior between developed and developing countries (Reynolds *et al.*, 2019; Xu *et al.*, 2020; Zhang *et al.*, 2022). Compared to developing countries, developed countries have a higher standard of living and income levels, so they have higher standards for food quality and aesthetics, which is an important factor in food waste (Thi *et al.*, 2015). Furthermore, studies by Filimonau *et al.* (2019) and Lee (2021) found that Asia is significantly less concerned about food waste and food sustainability than the West. In the dining culture of many developing countries, hosts tend to order more food than necessary at formal occasions to demonstrate their respect and hospitality towards guests (Wang *et al.*, 2017).

Numerous studies have linked childhood experience to adulthood behavior. Most current research on such chronological impact focuses on the effects of childhood food insecurity on physical and mental health in adulthood (Miller, 2017; Bethell *et al.*, 2019), eating habits (Olivieri and Triviza, 2021) and lifestyle (Fransen *et al.*, 2016). Duncan and Brooks (1997) indicated family economic conditions during early childhood appear to matter more than economic conditions during adolescence for shaping later development. For example, childhood poverty can lead to a lifetime of poverty (Harper, 2003). Child developmental theory suggests that early childhood may be especially sensitive to environmental conditions affected by family income (Duncan *et al.*, 2010), so childhood experiences and socioeconomic status can affect an individual's consumption behavior in adulthood (Mittal and Griskevicius, 2014). Especially, childhood exposure to hunger affects their food consumption during adulthood (Fransen *et al.*, 2016).

Early experiences of famine may give rise to two types of psychological responses (Kesternich, 2013). The first is the psychology of compensation for loss, where early food deprivation may lead individuals to seek compensation in later life, such as by consuming higher quality food and spending more on food, which can result in greater food waste (Cheng and Zhang, 2011; Gluckman *et al.*, 2005; Kesternich, 2013). Another possibility is the irrational psychological motivation of prevention, that is, the deep fear left by childhood experiences of famine (Cui *et al.*, 2020). This fear motivates people to adopt frugal habits and reduce food waste (Ding *et al.*, 2022). However, early experiences of famine can also weaken individuals' risk preferences in adulthood, which can lead to conspicuous consumption on special occasions (Conde *et al.*, 2021; Chen *et al.*, 2023) and affect the labor supply and income of famine survivors (Chen and Zhou, 2007).

Summarizing the existing literature, few studies have examined the behavior of taking leftovers home after dining out, which can help reduce food waste to some extent. A comprehensive investigation of the factors that affect taking-home behavior can provide insights into potential measures for reducing food waste. Furthermore, there is a lack of literature on the food waste of the “new-rich” from the perspective of consumption compensation. Based on CCT theory, this study examines how the food waste behavior of the “newly rich” in adulthood is influenced by childhood experiences of hunger, adding to the gap in the literature on childhood experiences of food consumption.

3. Theory

Based on CCT, people suffered from food insecurity in childhood tend to compensate themselves by consuming more when food is accessible later. Because of the drastic economic development in the last few decades in China, most current adults in urban areas belong to the new-rich category who were poor in childhood and are now living a middle-class life owning houses and enjoying vacations. These new-rich all experienced food scarcity in childhood because of the food ration under the planned economy, as is evidenced by over half of them claiming they didn't have enough food or nutrition at age ten on regular basis shown late in the data section. According to CCT, they tend to consume more to alleviate the pain of food insecurity memory in childhood. Furthermore, the conspicuous consumption behavior as part of the CCT reveal that they tend to show off by over-ordering and not taking home when dining out.

An understanding of CCT is aided with intertemporal indifference mappings, as illustrated in Figure 1. Previous food insecurity may be related to current food waste by measuring past food consumption, F and current food waste, W , on the axes. The threshold level of food security is indicated by a horizontal dash line, where above this threshold a consumer is food secure and below insecure. Assuming well-developed financial markets, the intertemporal budget constraint transforms past food consumption into current food waste. Further, assume two consumers, a and b, having the same preferences but different initial endowments of food securities $E^0 \wedge E^1$, resulting in panel for past food insecurity F^0 and b panel with food security, F^1 , subject to the same intertemporal budget constraint, I . Well-developed financial markets with no future uncertainty would result in the same optimal level of past food consumption, F and current food waste, W . This yields a higher level of satisfaction, U , relative to both initial endowments: U^0 and U^1 for the food insecure and food secure endowments, respectively.

Unfortunately, well-developed financial markets do not exist in many developing countries, including China and future uncertainty prevents the attainment of the theoretical optimal level of satisfaction, U . Instead, consumers are unable to transform current food waste into past food consumption by borrowing(leaning) in case of past food insecurity(security). The Polonius point of “neither a borrower, nor a lender be” corresponding to the endowments is now fixed. Neither a past food-insecure consumer nor

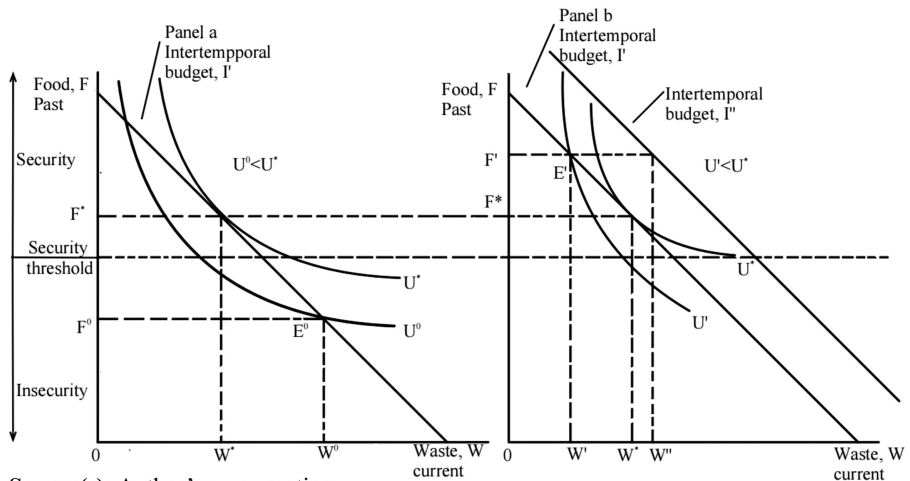


Figure 1.
Intertemporal past
food consumption and
current food-waste
decisions

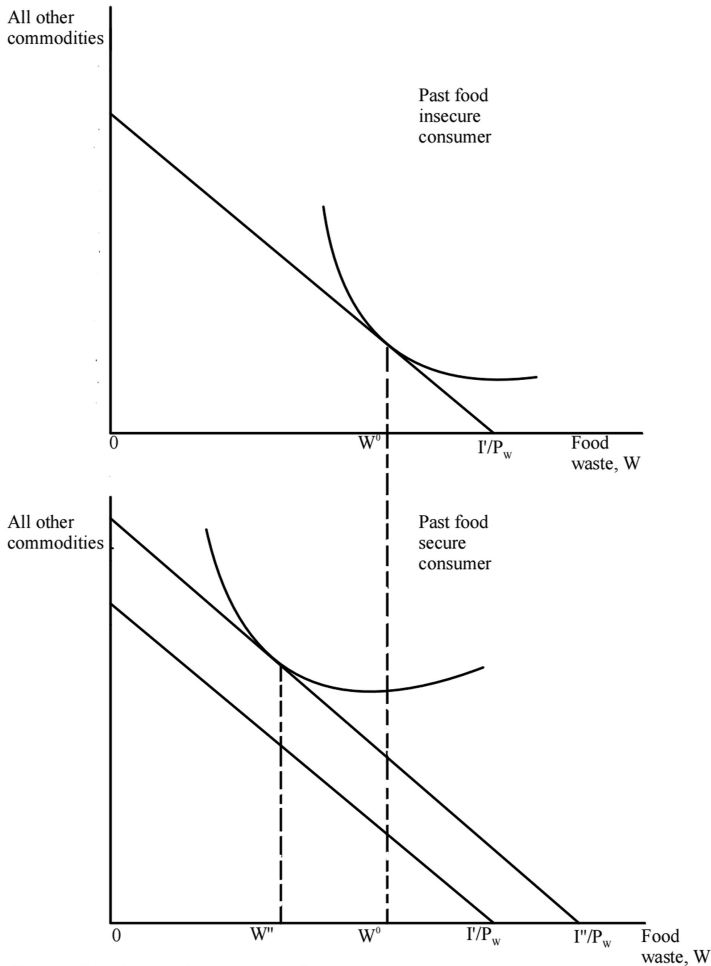
Source(s): Author's own creation

a food-secure consumer can change their combinations of food and waste to enhance satisfaction.

Relaxing the equivalence of income, a food-insecure (secure) consumer could have lower(higher) past income and higher(lower) current income with equivalent present values of income. The past food-secure consumer does not have a reduction in income from past to current, so the intertemporal budget constraint in panel b will shift outward to I' . The corresponding increase in current food waste is then W'' . It is possible the increase in income is not sufficient to result in $W'' > W^0$, so it is possible for $W'' \geq W^0$.

CCT then states the preferences of past food-insecure consumers yields $W^o > W''$. Figure 2 illustrates these preferences for the past food-insecure and secure consumers, with P_w denoting the per-unit price of waste, W , on the horizontal axis and all other commodities on the vertical, CCT is illustrated with $W^o > W''$. Holding satisfaction constant, at W^o , the past food-insecure consumer requires more of the other commodities

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Figure 2.
Illustration of the CCT

relative to the secure consumer for the same reduction in food waste. A food-insecure consumer values food waste, in terms of other commodities, higher than the food-secure consumer. Even with a higher present value of income, I'' , compared to I' , the past food-secure consumer will generate less waste, $W'' > W'$. This increase in current waste given past food insecurity is a measurement of the CCT effect.

For modeling these possible CCT effects in a restaurant dining context, a two-stage customer decision process is assumed. Consider customers first determine if they will have food leftovers from restaurant dining and if they do, the decision is to determine if they should take it home. Based on this two-stage decision process, a customer's problem is to maximize the following separable utility function

$$v = \begin{cases} u[y_1, y_1 - y_2, \bar{e}, \bar{x}], & \text{if } y_1(z, r) = 1 \\ 0, & \text{if } y_1(z, r) = 0 \end{cases} \quad (1)$$

where u represents the utility derived from how much food is left unconsumed and how much is wasted without taking home; $y_1(z, r)$ is an indicator function with 1 if there are leftovers $y_1(z, r) > 0$ and 0 otherwise resulting from the level of food ordering, z and the uncertainty of r ; y_2 denotes the amount of leftovers taken home also set at $y_2 = 1$ for taking home and 0 for not; \bar{e} denotes a vector of observable compensatory variables including past food security levels; and \bar{x} is a vector of control variables including factors such as income and food price. The two variables, y_1 and y_2 together represent compensatory consumption, so $U_1 > 0, \wedge U_2 > 0$.

The decision is to choose z and y_2 to maximize expected utility, when the uncertain r in $y_1(z, r)$ is based on the unknown dish sizes and the appetites of other dinners in the group

$$\max_{z, y_2} E(v). \quad (2)$$

The solution from the first order conditions of this expected utility maximization model are the two endogenous variables, $z(r, \bar{x}, \bar{e})$ and $y_2(r, \bar{x}, \bar{e})$ as functions of all the exogenous variables. Assuming, $\frac{\partial y_1}{\partial z} > 0$, for testing the CCT for food waste, then leftovers and taking them home are regressed against observable compensatory variables in a Heckman two-step probit model

$$y_1 = f[z(r, \bar{x}, \bar{e}), r], \quad (3)$$

$$y_2 = g(r, \bar{x}, \bar{e}). \quad (4)$$

The hypotheses are (1) the past food security (insecurity) levels contribute to leftovers negatively (positively), as well as to take-home positively (negatively) for compensatory consumption; and (2) uncertainty contributes to leftovers and take-home positively for rational consumption [1].

4. Data

An urban survey in three China cities, Beijing, Hangzhou and Qinhuangdao, was conducted in 2016, representing a first, second and third tier city, respectively. Within each city, restaurants were randomly selected, and restaurant diners were then also randomly recruited on-site while they dined in. Our enumerators identified the host(ess) of each dining party (the one who orders and pays the bill) and asked him/her to take the survey. Monetary compensation was provided for their willingness to participate, which yielded 419 completed surveys.

For analysis, new-rich are defined as individuals who were poor during childhood (specifically ten-years-old) with current family income now at least the middle-income level. Based on Forbes income groups, family income above 100,000 RMB (\$14,500) [2] is set as the middle-income (Forbes, 2010) and above 500,000 RMB as high income. Diners' childhood income level, poor or rich, is measured by a surrogate of whether they had enough food and nutrition, when actual income levels are unavailable as used in Braveman *et al.* (2017). A subjective self-assessed variable is solicited concerning whether one's feeling about his/her childhood family income relative to others.

Furthermore, current socioeconomic demographics and self-assessed relative income in the community Restaurant price, dining party size, and familiarity with the restaurant are also used. Table 1 lists the summary statistics. The survey is representative in terms of average age, gender (47% female) and annual family income categories (China Profile, 2017). The respondents have an average education of 13 years, with education levels ranging from junior college, undergraduate to postgraduate and the average household size is three.

Hunger10H and *Hunger10 M* are dummy variables: taking value one if they often felt hungry or although they were not hungry but didn't have sufficient nutrition at age ten and taking value zero otherwise. The results indicate that 5% often experienced hunger, 49% were OK but with insufficient nutrition, and the rest 45% were good in childhood. In addition, we include a variable indicating whether they lived in rural areas during childhood, *Childhood Residence*, taking value 1 if yes and 0 otherwise, because studies indicated that children living in rural areas are more likely to experience economic hardship (Eberth *et al.*, 2022). The results indicate that 35% of respondents had a rural childhood.

There subjective income assessment is based on three categorical variables. The first is childhood income, *Com_youth_L* indicating childhood household income is below average, with 21%. The second is the current income level, *Com_current_L* indicating the current income is lower than others, 16%. These two levels indicate restaurant diners tend to be people with above average income. The third is income trends, *Com_past_L* indicating the household income has decreased, with 12% consistent to overall fast economic growing that most people have an income increase. They measure diners' feelings of their social standing, both currently and during their childhood. The CCT would indicate such feelings will yield more leftovers and not taking them home.

The income change groups are divided into four parts based on the respondents' views on childhood income and current income. *Poor_rich* indicates household income was below average at age ten, but now thought it was above average. These are termed the new-rich group comprising 30% of the respondents; with 24%, *Poor_poor*, having consistently earned below-average income, and *Rich_Poor* 13% previously had above-average income but are now below-average, the rest consistent rich.

In addition, personal dining habits and restaurant characteristics had an impact on over-ordering and taking leftover food home (Wang *et al.*, 2017; Xu *et al.*, 2020). We include *Dinner*, which indicates whether the meal was dinner, *Familygat* indicating whether the meal is a family meal, *First-Timer* whether the customer has come to this restaurant for the first time which represents the customer's familiarity with the restaurant, *Coupon* whether they used merchant or discount coupons for this meal and *Rest-level*, the restaurant price level of the main course.

Table 2 lists the number of dining groups who had leftovers, and if so, whether the diners took them home. Approximately 90% had leftovers with 47% taking them home.

5. Empirical model

Because the behavior of taking home restaurant left-over food depends on the leftover availability resulting from the food ordering behavior, there exists a self-selection bias in

Characteristic	Description	Statistic (%)
<i>Objective childhood situation</i>		
Hunger10H	= 1, if often felt hungry at the age of ten; = 0, otherwise	5
Hunger10 M	= 1, if had enough food but not enough nutrition at the age of ten; = 0, otherwise	95
Childhood residence	= 1, if lived in rural areas before the age of ten = 0, otherwise	49
<i>Subjective income assessment</i>		
Com_youth_L	= 1, if childhood family income below average = 0, otherwise	21
Com_current_L	= 1, if current income less than others = 0, otherwise	79
Com_past_L	= 1, if family income level has been declining in recent years = 0, otherwise	16
<i>Income chang groups</i>		
Poor_rich	= 1, if participants thought household income was below average at the age of ten, but now thought it was above average = 0, others	84
Poor_poor	= 1, if feel household income levels were below average at ten years old and also now = 0, otherwise	12
Rich_poor	= 1, if feel household income was above average at age ten but below average now = 0, otherwise	88
<i>Dining details</i>		
First-Timer	= 1, if is the first-time dining in this restaurant; = 0, otherwise	30
Dinner	= 1, if it is dinner = 0, otherwise	70
Coupon	= 1, if this meal enjoys a discount with coupons = 0, otherwise	24
Familygat	= 1, if it is family dinner = 0, others	76
Num_gathering	Number of people dining together (count)	4
Restaurant Level	Average price of the restaurant (Yuan/main dish)	96
<i>Socioeconomic</i>		
Male	= 1, if male = 0, if female	Mean:3.26 Std.Dev:1.89
Household	Number of people living at home	Mean:53.74 Std.Dev:19.73
Famincome (thousand RMB)	Participant's total household income in 2016 (for all people living together)	Mean:177.33 Std.Dev:133.47
Age	Years of age	Mean:35.64 Std.Dev:10.01
<i>City</i>		
Beijing	= 1, if resident in Beijing = 0, others	27
Hangzhou	= 1, if resident in Hangzhou = 0, others	73
		37
		63

Table 1.
Summary statistics

Source(s): Authors' own work

Table 2.
Number of leftovers
and take-home

Take-home	No		Leftovers		Yes	
	Number	Percent	Number	Percent	Number	Percent
No	43	10	179	43		
Yes	–	0	197	47		

Note(s): The leftover threshold is set at 5%, and any remaining food below this threshold is not considered leftover^a

^aLeftovers are measured as the portion of edible food left on plates after eating, excluding seasonings and food scraps (bones, shrimp shells, etc.). Our trained statisticians roughly estimate the proportion of leftovers on the plate after the meal is finished

Source(s): Authors’ own work

the regression analysis of the taking-home behavior. The Heckman two-step model is adopted in the analysis to handle the selection bias (Heckman, 1976). The first step is a probit selection model determining the likelihood of whether diner i will order excess food yielding leftovers

$$y_{1i} = f(I_{PRi}, I_{PPi}, I_{RPi}, r_i, c_i, \bar{x}_i), \quad (5)$$

where y_{1i} is one if diner i has leftovers and zero otherwise; I_{PRi} , I_{PPi} , and I_{RPi} are indicator variables indicating if diner i transitions from poor to rich, poor to poor and rich to poor, respectively, leaving those remaining rich as the default; and r_i and c_i are control variables. Variable r_i represents risk measured by whether being the first time in the restaurant, and c_i is a vector including the per person price and whether discounts were used. Furthermore, \bar{x} are a vector of control variables.

To identify selectivity, it requires some exogenous variables included in the first stage but not in the second stage and an Inverse Mill’s Ratio (IMR) calculated from the first stage in the second stage as an exogenous variable (Heckman, 1976; Lennox *et al.*, 2012). r_i and c_i are used as those first stage only exogenous variables without direct effect on the second stage dependent variable, y_{2i} , whether to take home or not (Lennox *et al.*, 2012). Eating at a restaurant for the first time (*First-Timer*) may suggest incomplete information about the portion size with associated larger leftovers (McAdams *et al.*, 2019). The per person price of the meals (*Restaurant Level*) can directly influence how much food diners order, with low prices attracting impulse purchases and leading to food waste (Liao *et al.*, 2022). Following Xu *et al.* (2020), coupons (*Coupon*) reduce the cost of meals, which can lead to overbuying and increase the likelihood of food waste (Parker *et al.*, 2018). Familiarity with the restaurant, restaurant price levels and coupon usage have little direct influence on taking home behavior, which is determined more by convenience and factor associated with one’s pride (Talwar, 2023). Additionally, \bar{x} is a vector of other control variables for diner i , including meal characteristics, consumer characteristics and demographic variables.

Only if there are leftovers is it observed if they are taken home. The model is then based on whether leftovers are taken home, given the selection leftovers equation. This requires first testing whether the new-rich tend to have more leftovers and then testing whether the new-rich is associated with less leftovers taken home

$$y_{2i} = g(I_{PRi}, I_{PPi}, I_{RPi}, \bar{x}_i), \quad (6)$$

where y_{2i} is one if diner i takes home food and zero otherwise. Equation (6) is used to analyze whether the newly rich group will take leftovers home. The vector \bar{x}_i includes *Dinner*, *Num_gathering*, *Childhood Residence*, *Family* and demographic variables.

Because y_1 and y_2 are both binary variables, a probit model is used for each of the regression equations. The Heckman two-step probit model specifies that the probit equation is:

$$y_2 = \text{Prob}(\bar{x}\beta + u_1 > 0),$$

and the selection equation is

$$y_1 = \text{ProbIMaR}(\bar{w}\gamma + u_2 > 0),$$

where both u_1 and u_2 have standard normal distributions with correlation ρ . Vector \bar{w} contains the control variables included in (5).

6. Results

Employing maximum likelihood for the two equations, the parameters β and γ together with the IMR, $\text{atanh } \rho, \frac{1}{2} \ln\left(\frac{1+\rho}{1-\rho}\right)$ are estimated and reported on the left side of Table 3. Alternative model specifications are estimated and reported. The new-rich indicators are replaced by childhood hunger experience and relative household economic status at different life stages as robustness tests. However, the ρ is insignificant for most regressions, this rejects the correlation between the errors of the two equations for most regressions. We also run independent probit regressions, results of which are consistent with Heckman two-step models.

Considering the packed regression (5), relative to the rich remaining rich, the poor to rich variable, I_{PR} , increases the likelihood of taking away leftover food at the 10% significance level. This indicates the new-rich are more likely associated with less leftover takeaway behavior. The new-rich have lower incomes in early childhood and may have experienced hunger as a result, leading to a greater need for food consumption in adulthood to compensate. Furthermore, the new-rich may perceive themselves as having lower childhood incomes than others, and this perceived difference leads to conspicuous consumption in adulthood (Sun *et al.*, 2020), leading to food wasting behavior. Thus, our results conformed with CCT. Sun *et al.*, (2020) have explained this food waste behavior of the new-rich both objective experiences and subjective psychological factors. Building on the results of the poor-to-rich group, we investigated whether the experience of childhood hunger and the subjective income assessment of diners compared to others would impact their leftover takeaway behavior.

The study results demonstrate diners' objective childhood hunger experiences have a significant impact on leftover take-away behavior with significance and magnitude changing with the degree of hunger. Specifically, *Hunger10H* has a positive influence on leftovers and a negative influence on take-home at the significance level of 1% indicating individuals who experienced hunger in childhood are more inclined to generate leftovers and are unwilling to take them home. *Hunger10M* has a negative sign on take-away leftover at only the significance level of 15%. This indicates their hunger experience during childhood affects their current status in deciding whether take leftovers: the more severely they experienced hunger during childhood, the more likely they left with leftovers. As modeled in Figure 2, this directly supports the CCT. The lack of food in the past is compensated by the waste in the form of excessive acquisition of food. This supports the first hypothesis that past food

Variable	Newrich		Hunger10		Com_youth		Com_current		Com_past	
	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers
Poor_Rich	-0.288*	0.085								
	(0.180)	(0.238)								
Poor_Poor	0.077	0.266								
	(0.245)	(0.317)								
Rich_Poor	0.278	0.213								
	(0.260)	(0.333)								
Hunger10H			-0.754**	4.896***						
			(0.432)	(0.254)						
Hunger10 M			-0.230 ^a	0.015						
			(0.157)	(0.206)						
Com_youth_L					-0.425***	-0.356**				
					(0.186)	(0.216)				
Com_current_L							-0.442***	-0.132		
							(0.206)	(0.247)		
Com_past_L									-0.240	0.167
									(0.206)	(0.313)
Dinner	0.030	-0.192	0.047	-0.261	0.028	-0.269	0.036	-0.224	0.074	-0.211
	(0.140)	(0.210)	(0.170)	(0.245)	(0.137)	(0.204)	(0.142)	(0.211)	(0.139)	(0.209)
Num gathering	0.046	-0.042	0.047	-0.042	0.044	-0.045	0.053	-0.041	0.041	-0.040
	(0.039)	(0.043)	(0.041)	(0.046)	(0.038)	(0.042)	(0.040)	(0.044)	(0.039)	(0.044)
Childhood residence	0.187	0.177	0.275 ^a	0.167	0.204	0.272	0.205	0.250	0.153	0.210
	(0.162)	(0.215)	(0.180)	(0.215)	(0.160)	(0.209)	(0.159)	(0.210)	(0.156)	(0.209)
Familygat	-0.024	0.410	-0.017	0.483	0.053	0.435	0.095	0.500	0.019	0.399
	(0.351)	(0.550)	(0.392)	(0.539)	(0.353)	(0.537)	(0.367)	(0.566)	(0.352)	(0.545)
Male	-0.223 ^a	-0.049	-0.232	-0.059	-0.225*	-0.009	-0.272**	-0.046	-0.235*	-0.028
	(0.144)	(0.215)	(0.163)	(0.278)	(0.138)	(0.206)	(0.143)	(0.211)	(0.144)	(0.225)
Eduyear	-0.024	0.030	-0.034	0.042	-0.035	0.016	-0.028	0.024	-0.032	0.024
	(0.033)	(0.043)	(0.037)	(0.049)	(0.033)	(0.043)	(0.034)	(0.043)	(0.033)	(0.046)
Age	0.007	0.012	0.007	0.011	0.004	0.015	0.004	0.012	0.003	0.012
	(0.008)	(0.013)	(0.008)	(0.018)	(0.008)	(0.012)	(0.007)	(0.012)	(0.007)	(0.012)

(continued)

Will the
“nouveau-
riche” waste
more food

Table 3.
Regression results

Table 3.

Variable	Newrich		Hunger10		Com_youth		Com_current		Com_past	
	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers	Take home	Leftovers
Beijing	0.608*** (0.222)	0.445** (0.267)	0.649** (0.360)	0.429 ^a (0.276)	0.545*** (0.209)	0.433 ^a (0.282)	0.630*** (0.226)	0.462** (0.267)	0.522*** (0.231)	0.440** (0.264)
Hangzhou	0.796*** (0.219)	1.695*** (0.401)	0.863** (0.503)	1.735*** (0.407)	0.752*** (0.193)	1.693*** (0.414)	0.847*** (0.229)	1.721*** (0.410)	0.759*** (0.229)	1.705*** (0.406)
Household	-0.087** (0.047)	-0.089** (0.049)	-0.087** (0.047)	-0.087** (0.047)	-0.087** (0.047)	-0.087** (0.047)	-0.092** (0.049)	-0.092** (0.049)	-0.095*** (0.047)	-0.095*** (0.047)
Famincome	0.001** (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Coupon	0.104 (0.192)	0.104 (0.192)	0.104 (0.192)	0.146 (0.206)	0.104 (0.192)	0.205 (0.215)	0.136 (0.200)	0.136 (0.200)	0.132 (0.195)	0.132 (0.195)
Restaurant level	-0.008* (0.005)	-0.008* (0.005)	-0.008* (0.005)	-0.008 ^a (0.005)	-0.008* (0.005)	-0.009** (0.005)	-0.008 ^a (0.005)	-0.008 ^a (0.005)	-0.008 ^a (0.005)	-0.008 ^a (0.005)
First-timer	0.151 (0.183)	0.151 (0.183)	0.151 (0.183)	0.152 (0.286)	0.151 (0.183)	0.198 (0.193)	0.156 (0.188)	0.156 (0.188)	0.169 (0.187)	0.169 (0.187)
Inverse Mill's ratio)	-0.985 (0.691)	-0.985 (0.691)	-0.985 (0.691)	-0.591 (1.613)	-0.985 (0.691)	-1.174*** (0.563)	-0.785 (0.593)	-0.785 (0.593)	-0.980 (0.798)	-0.980 (0.798)
N	417,000	417,000	417,000	417,000	417,000	417,000	417,000	417,000	417,000	417,000

Note(s): Standard errors are in the parentheses with ^a, *, **, and *** denoting 15, 10, 5 and 1 % level of significance, respectively

Source(s): Authors' own work

security (insecurity) levels contribute to leftovers negatively (positively), as well as to take-home positively (negatively) for compensatory consumption.

For further support for compensatory consumption, consider the subjective income assessment of diners compared to others. Inferiority affected taking-home behavior when compared to others, but neither leftovers nor taking-home behavior was affected compared to one's own past. In [Table 3](#), results of comparison to their peers (defined as general people living in their community) show that peer pressure at childhood and in the past two years both affect their current food waste behavior. *Com_youth_L* has a significant negative effect on take-home and leftovers at the 5% level. *Com_current_L* has a negative impact on take-home at the 5% level. On the contrary, *Com_past_L* has no significant effect on generating leftovers and taking them home. This indicates the more likely they feel inferior comparing to their peers during childhood or during the past two years, the less likely they would take leftover food home. Under the influence of peer pressure, households with below-average income may have a negative evaluation of their self-worth. At this point, dining out has become a means for low self-esteem people to compensate for their self-esteem ([Jiang et al., 2015](#)). Therefore, peer pressure conducts unreasonable ordering behaviors and causes food waste, which proves that the consumer compensation is more of a psychological effect.

By not taking home left-over food, the new-rich waste more food relative to the long-rich diners. This supports the hypothesis that China's new-rich tend to waste relatively more food, which is further supported by diners who feel their income are less than others decrease the likelihood of taking leftovers home by 14%. This finding supports the argument that households with low-income confidence are less likely to take leftovers home because they do not want to be seen as cheap by others. Similarly, those who felt inferior in terms of the family income during childhood, also, decrease their likelihood by 15%. Such childhood inferiority, based on CCT, result in higher levels of food waste. Specifically, our results of individuals who experienced childhood food shortages and then entered a higher-income class tend to waste more food, consistent to [Mittal and Griskevicius \(2014\)](#) and [Sun et al. \(2020\)](#). In the past, conspicuous consumption was widespread in the affluent societies of developed countries, but now, also emerging among the new middle classes in emerging countries ([Rahman et al., 2017](#)). The subjective income assessment, *Com_Current_L* and *Com_Youth_L*, and the objective income measurement, *Poor-Rich*, have a different effect on take-home behaviors. The compensatory consumption behavior is more prevalent by the subjective feeling of income status, a psychological effect.

Furthermore, other significant variables mitigate this negative effect of the I_{PR} . Results show that uncertain factors do not affect leftovers, but positively influence take-home behavior. The price of the main dish at the restaurant (*Rest-level*) also affects customer behavior. The results also demonstrate that *Restaurant level* has a negative impact on leftovers at the 10% significant level, consistent with [Wang et al. \(2017\)](#). The higher the price of the main dish, the fewer food leftovers. *Coupon* was added to the model based on existing research ([Xu et al., 2020](#)), and sample selection and period contributed to the insignificance of the results. Finally, regarding gender and cities, male diners with larger families are less likely to take home leftovers. For *Household*, the negative sign indicates diners from larger households tend not to take home their leftovers. This can be explained that diners from relatively smaller households tend to take home their leftover, because the leftovers are easily becoming another meal for the small family to save their cooking efforts. *City* dummy variables for Beijing and Hangzhou are positive significantly, suggesting diners in first and second-tier cities tend to have more leftover food than relative smaller cities. Restaurant diners in Beijing and Hangzhou tend to take home compared to those in Qinhuangdao. This may be due to the stronger promotion of the

“Clean Plate Campaign” in first and second-tier cities, which encourages more consumers to take social responsibility (Talwar *et al.*, 2023) and also restaurants to provide more convenient containers for diners to take home leftovers.

To highlight the compensatory and conspicuous consumption phenomenon, we listed the food waste behavior of the new rich and others separately in Table 4. Food waste behavior among the new rich accounted for 91%, higher than that of their counterparts. Meanwhile, the proportion of taking-home among the new rich is lower than others. In addition, we discovered that the average per capita cost for restaurants where the newly rich dine in, 56.11, is statistically significantly higher than that of others, 52.71. This indicates that the newly rich choose fancier restaurants, generate more leftovers, but take home less. This further supports our results of and conspicuous and compensatory consumption.

7. Conclusions and policy implications

Although current literature indicates food consumption demand increases with economic growth, limited if any literature focuses on the dynamic change itself. We find the new-rich is associated with high restaurant leftovers and low possibility to take home, which supports the CCT hypothesis. Our empirical results also indicate not only the level but also the change in income leads to higher levels of food waste. In a fast-growing economy with consumers having rapid and unbalanced income growth, fostering a culture to discourage compensatory consumption deserves social attention. The objective income growth does not necessarily induce compensatory consumption and excessive waste, but the subjective feeling of income growth especially if it comes with unbalanced distribution will.

For policy deliberations, our results indicate the memory of childhood food insecurity still influence the new-rich current food-waste behavior. This allows for precise targeting of people and suggests possible educational programs and/or incentives directed specifically to the new-rich may be effective mechanisms to mitigate food waste. Furthermore, developing countries have different characteristics than developed countries in terms of food waste. This requires an alternative, targeted policy framework for food waste policies that are designed specifically for developing countries. Policies should guide society to develop a rational perception of food consumption and actively promote the habit of simple eating, especially in social dining. The impacts of CCT for the new-rich also indicate that market demand is more complex than previous modeling efforts have considered. This suggests a linear extrapolation forecast of food demand and associated food waste may not be correct.

	New rich	Others
Left over	91%	89%
Packed	44%	48%
Restaurant level	56.11**	52.71

Table 4. Food waste behavior of the “new rich” and others

Note(s): ** Sample *t*-test with $p < 0.05$
Source(s): Authors’ own work

Notes

1. All the significant effects in the behavior equation are economic status factors, the compensating consumption effects. We tested and found the support that more expensive restaurants would not increase the possibility of taking home leftovers. The strong economic status motivation dominates the economic motivation, which is consistent to the negative effect of Income-Less-Others.
2. These results are quite robust in terms of other family income measurements at alternative switching points to 100,000 RMB and excluding some of the control variables. Specifically, regressions with only one feeling variable and excluding the income groups also yield similar results.

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