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Regional differences in urban residents' consumption behaviour in China: from the perspective of the habit formation time effect

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ABSTRACT

This study constructs a panel extended linear expenditure system (ELES) model that includes the theory of internal habit formation and expands the theoretical connotation of the original model. It also decomposes the dynamic evolution characteristics of Chinese urban residents' psychological and physiological needs among various consumption expenditures. It explains the partial causes of the time effect in the panel ELES model from consumer behaviour. We have obtained the following innovative conclusions after the empirical analysis of urban residents' consumption behaviour in different regions of China. First, urban residents have habit formation effects on seven types of consumption expenditure. Second, the timeliness of the psychological needs of various commodity expenditures differs between the eastern and mid-western region of China, and this difference has expanded since 2013. The COVID-19 pandemic has reduced the psychological needs for various commodity expenditures while having little impact on physiological needs. Finally, the study puts forward some policy recommendations, such as tapping the potential of commodity consumption with psychological needs growth, further enhance the cultivation of low-income people's consumption in the mid-western region, and implementing more detailed consumption supports with different regions' consumption preferences.

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1. Introduction

Consumer behaviour is an economic as well as a social behaviour. Baudrillard (1998) proposed that consumption was a complex social psychological phenomenon affected by consumers' income, physiology, and psychology. It was also affected by the external social environment of consumers' activities, including regional economic development, social classes, consumer family environments, consumer groups (Desbouys et al., 2019). Moreover, different regions have different natural and social environments, leading to

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even deeper differences in regional cultures, ethnic customs, consumer groups, and governmental functions. These differences affect residents' consumption behaviour, form different regional consumption characteristics, and produce different psychological and physiological needs for the consumption of various commodities.

The consumption structure is the manifestation and expression of consumption behaviour. Cultural and economic differences cause noticeable regional differences in residents' consumption structures in various regions. The formation of internal habit is an essential factor that affects residents' consumption. The questions worth asking here are as follow: How does habit formation affect residents' consumption structure in different regions? What kind of dynamic impact does it have on urban residents' psychological and physiological needs among the various consumption expenditures in different regions? Moreover, what are the differences in urban residents' psychological and physiological needs in different areas among various consumption expenditures? Therefore, this study aims to test the urban residents' consumption habit formation effect and time effect of physiological and psychological needs in different regions by expanding the panel extended linear expenditure system (ELES) model with habit formation theory and grasp the regional differences in urban residents' consumption habit formation.

This study will shed light on the internal habit formation effect of urban consumers in different regions among various commodities and provide references and realistic bases for effectively formulating policies and measures to improve consumption quality, expand consumption capacity and stimulate consumption potential to meet urban residents' multi-level and diversified consumption needs. These references and realistic bases have great practical significance in enhancing the basic role of consumption in high-quality economic development.

2. Literature review

Previous studies had explored the influences of residents' consumption habit formation theory. Duesenberry (1949) introduced the habit formation theory into the study of residents' consumption. He believed that current income and past consumption habit affected residents' consumption. Since then, many scholars have incorporated habit-forming factors into different consumption models to study the influences of habit formation on residents' consumption and deposit behaviour from different perspectives.

The first aspect is the use of ELES model to study the impact of habit formation on consumption structures. Pollak (1970, 1976), Phlips (1972) and Lluch and Williams (1975) introduced the theory of internal and external habit formation in the ELES model to study influential factors, such as income change and habit formation on consumption structure. Moreover, Korniotis (2010), Arie Kapteyn et al. (1997) and Alessie and Teppa (2010) also used the ELES model to study the impact of external habit formation on consumer behaviour.

The second aspect is the use of reverse almost-ideal demand system (AIDS) to study the impact of habit formation on total household consumption and single commodity consumption. For total household consumption, habit formation was an

important explanatory variable affecting household consumption (Gardner et al., 2019; Hang, 2009; Hang & Shen, 2009; Lei, 2009; Zhang & Ling, 2015). Habit-forming characteristics were significant for urban residents' consumption in China (Chen & Song, 2019; Liu, 2017). For single commodity consumption, Holt and Goodwin (1997) and Verhelst and Van den Poel (2014) indicated that habit formation had a significant impact on U.S. meat spending as well as fruit consumption expenditure in Holland. Chinese rural residents' various consumption expenditures showed significant internal habit formation; in particular, expenses in transportation, communication, education, culture, and entertainment services were affected by the demonstration effect of urban residents (Yan & Hang, 2010).

The third aspect is the use of Dynan model or extended Dynan model to study the impact of habit formation on residents' consumption behaviour. The results showed that habit formation had a significant impact on rural residents' consumption, urban average consumption propensity, and urban residents' consumption behaviour (Hang, 2010; Huang & Zong, 2014; Qi & Wang, 2007).

The fourth aspect is the use of Naik and Moore model or the improved Naik and Moore model to study the impact of habit formation on single commodity consumption expenditure and residents' consumption. Previous studies had shown that habit formation significantly impacted food consumption (Long et al., 2002; Zhai & Hu, 2017; Zhai et al., 2021). The consumption behaviour of rural residents showed significant internal habit formation, and was also affected by demonstration effect of rural residents (Cui & Fan, 2011).

The fifth aspect is the use of utility model or linear regression model to study the impact of habit formation on residents' consumption and savings. For residents' consumption, researchers showed that habit formation had an important impact on consumption spending at different levels (Hang & Yan, 2013; Jung & Bice, 2019; Verhelst & Van den Poel, 2014). Habit formation had impact on the optimal consumption flow for various commodities (Muraviev, 2011) as well as on the over-sensitivity and over-smoothing of residents'consumption (Ai & Wang, 2008; Alessie & Lusardi, 1997; Chetty & Szeidl, 2016). Food consumption in China had a habit-forming effect (Jia et al., 2011). Rural residents' consumption was affected by habit formation with a noticeable ratchet effect (Wang et al., 2016). During new urbanisation, the urban demonstration effect improves the consumption level of rural residents. For residents' savings, the study results showed that habit formation was the main factor affecting the saving behaviour of Dutch residents (Alessie & Teppa, 2010).

Although the extant literature on habit formation theory is rich, it has some limitations. First, most scholars focused on the impact of internal and external habit formation on household savings, income sensitivity (Bhatt et al., 2017; Xu & Gong, 2020), total consumption, social media consumption (Goh et al., 2019), and single commodity consumption. However, very few studies have decomposed the basic needs of urban residents into seven categories of consumption expenditure. Moreover, research on the dynamic impact of habit formation on physiological and psychological needs from the perspective of time evolution is lacking. Second, some scholars had studied residents' consumption structure through AIDS, Dynan, or ELES models (Li et al., 2008; Stone, 1954). However, they lacked a comparative analysis of

urban residents' consumption habit in different regions among various commodities, and their ELES model was not a panel model.

Scholars had mainly studied the impact of regional differences on residents' consumption behaviour from the following aspects: (1) research on the impact of regional infrastructure conditions on residents' consumption. Ahmed et al. (2018) suggested that long-term public food consumption policy should consider regional differences. Research indicated that the medical care, health and natural conditions had a stable co-integration relationship with local rural residents' consumption. These factors had a significant impact on the growth of rural residents' consumption (Geng, 2012). The differences in the impact of the rural circulation infrastructure environment on rural consumption structure expenditure were significant (Wu, 2014). Factors such as rural urbanisation, the dual structure of urban–rural circulation, and supporting services significantly impacted the consumption gap between urban and rural residents (Wu, 2015). Research had indicated that government expenditure in different regions significantly affected residents' consumption (Ahmed, 1986; Chen, 2011; Li, 2005; Zhang, 2006). Other infrastructure investments had different crowding-out effects on residents' consumption (Yang & Yin, 2017). (2) Research on the impact of regional soft environment construction on residents' consumption. Residents' consumption behaviour could be significantly affected by regional government functions and the social environment (Karras, 1994; Maček et al., 2021; Schclarek, 2004; Veenhoven, 1996). The impact of different social environments on residents' consumption habits and demonstration effects showed noticeable regional differences (Ding & Zhu, 2013; Duesenberry, 1949). Regional economic differences, income gaps, borrowing levels, regional development, and social security affected regional consumption gaps (Han & Du, 2012; Wang & Liu, 2011; Zhao & Yuan, 2013). The social consumption environment had a significant impact on consumers' various needs (Veenhoven, 1996). Yan et al. (2021) showed that consumers' psychological needs affected their consumption preferences. Regional economic and income differences between provinces were the main reasons for expanding the inter-provincial consumption gap (Zhao & Yuan, 2013). Regional consumption differences in Chinese rural areas had shown divergent trends since 1993. Moreover, regional per capita disposable income and the degree of regional development were the main reasons for the difference of urban residents' consumption (Wang & Liu, 2011). Significant regional differences existed in income level, urbanisation rate, real estate market development scale, and residents' consumption habits (Ding & Zhu, 2013). The impact of borrowing level and income gap on residents' consumption showed strong urban–rural and regional differences (Han & Du, 2012). Moreover, factors such as inadequate social security and unbalanced regional development affected the nature and degree of consumption (Han & Du, 2011). Additionally, China's urban household consumption inequality was closely related to regional differences (Zhou & Zhang, 2019). Urban–rural and regional differences significantly impacted the welfare effects of the slowdown of residential consumption growth speed and consumption inequality.

For geographical factors of residents' consumption, the research literature focused on regional infrastructure conditions (including natural environment and

infrastructure, such as transportation, communication, and medical care) and soft environment construction (mainly government functions, economic differences, income levels, social security). Few scholars have studied the regional differences in urban residents' habit formation among various consumption expenditures as well as the physiological and physiological needs of multiple commodities between economically developed and undeveloped areas. Thus, this study innovatively constructs a panel ELES model that includes internal habit formation, empirically studies the regional differences in the internal habit formation of Chinese urban residents' consumption structure, and decomposes the influence mechanism of internal habit formation on residents' consumption expenditure. This study also compares and analyses the dynamic changes and regional differences in urban residents' psychological and physiological needs in different regions regarding the consumption expenditure of various commodities. The contributions of this study are as follow: First, it embeds the internal habit formation into the ELES model and builds a panel ELES model, which expands the modelling theory of the ELES model and constructs a new model system as a new research idea and method to empirical study consumption structure. Second, this research's model can effectively analyse the regional differences, single commodity differences and dynamic characteristics of residents' consumption 'ratchet effect' among different income groups.

3. Theoretical model construction

The principle of the ELES model and the economic meaning of the parameters are intuitive, and the modelling data are easy to obtain. Thus, the ELES model is the most widely used model in empirical studies of consumption structures. From the perspective of consumption theory, the ELES model is equivalent to the absolute income hypothesis, which assumes that demand for various commodities (services) depends on income and commodity prices. However, with the development of economy and the growth of residents' income, people's living consumption has shifted from subsistence consumption to modern enjoyment consumption. Personalised and diversified consumption has gradually become mainstream; hence, analysing residents' various commodity demands only by using the ELES model has deficiencies, and new consumption theories must be integrated. Therefore, the new consumption theory is vital for extending the ELES model when studying residents' consumption structure.

In modern consumption theory, internal habit formation describes the effect of consumers' past consumption behaviour on current consumption utility. External habit formation reports that consumer' decision-making can be affected by demonstration groups around consumers. These are also known as the 'ratcheting effect' and the 'demonstration effect' of consumption. Some scholars used the ELES model to study the impact of habit formation on residents' consumption behaviour but without using the panel ELES model. Pollak (1970) was the first to embed the formation of internal habits into the ELES model. However, his research was not a panel ELES model. He believed that the formation of internal habit affected basic demand, and the basic demand affected early consumption mainly through following equations:

$$\gamma_{\mathrm{t}}^{(\mathrm{k})} = \psi^{(\mathrm{k})} \mathrm{q}_{\mathrm{t}-1}^{(\mathrm{k})} \tag{1}$$

$$\gamma_{\mathrm{t}}^{(\mathrm{k})} = \gamma_{0}^{(\mathrm{k})} + \psi^{(\mathrm{k})} \mathrm{q}_{\mathrm{t}-1}^{(\mathrm{k})}, \ 0 \leq \psi^{(\mathrm{k})} < 1 \tag{2}$$

$$\gamma_{\mathrm{t}}^{(\mathrm{k})} = \psi^{(\mathrm{k})} \mathrm{y}_{\mathrm{t}-1}^{(\mathrm{k})}, \ \mathrm{y}_{\mathrm{t}-1}^{(\mathrm{k})} = (1-\delta) \sum_{\mathrm{j}=0}^{\infty} \delta^{\mathrm{j}} \mathrm{q}_{\mathrm{t}-1-\mathrm{j}}^{(\mathrm{k})}, \ 0 \leq \psi^{(\mathrm{k})} < 1, \ 0 \leq \delta < 1 \tag{3}$$

These three forms can be unified as:

$$\gamma_{t}^{(k)} = \gamma_{0}^{(k)} + \psi^{(k)} y_{t-1}^{(k)}, \ y_{t-1}^{(k)} = (1-\delta) \sum_{j=0}^{\infty} \delta^{j} q_{t-1-j}^{(k)}, \ 0 \leq \psi^{(\mathrm{k})} < 1, \ 0 \leq \delta < 1 \tag{4}$$

where $\gamma_{t}^{(k)}$ is the basic consumption of the k-th commodity in period t, $q_{t-1}^{(k)}$ is the demand for the k-th commodity in t-1 period, $\psi^{(k)}$ is the internal habit formation parameter of the k-th commodity, indicating that the habit formation stock affects current consumption. $\gamma_{0}^{(k)}$ is the physiological need of the k-th commodity, and $\psi^{(k)} q_{t-1}^{(k)}$ is the psychological need of the k-th commodity. Model (1) shows that the basic consumption in period t is directly proportional to the demand in period t-1, and Model (2) shows that the basic consumption of the k-th commodity comprises physiological and psychological needs. Moreover, the basic consumption in period t comprises two parts: physiological needs and the weighted average of all previous demands (consumption). Model (4) is the model form of the habit formation effect on consumption demand (Pollak, 1970). However, this model does not consider consumers' disposable income, which also means that it does not consider the impact of budget constraints on consumption. Thus it cannot obtain the time effect of physiological needs. Using the utility function form proposed by Klein and Rubin (1947):

$$U = \sum_{k=1}^{M} \beta^{(k)} \ln \left(q^{(k)} - \left(\gamma_{0}^{(k)} + \psi^{(k)} y_{t-1}^{(k)} \right) \right) \tag{5}$$

where β is the marginal budget share representing the allocation ratio of an additional budget unit on various commodities. Model (5) shows that the utility of consumption is affected by internal habit. Adding the budget constraint, that is, the consumption utility is affected by the income constraint. The conditional equation for maximising the current utility is:

$$\begin{cases} Max \quad \sum_{k=1}^{M} \beta^{(k)} \ln \left(q_{t}^{(k)} - \left(\gamma_{0}^{(k)} + \psi^{(k)} y_{t-1}^{(k)} \right) \right) \\ s.t. \quad \sum_{k=1}^{M} p^{(k)} q_{t}^{(k)} \leq I_{t} \end{cases}$$

Obtain the Lagrangian function for maximum

$$L = \sum_{k=1}^{M} \beta^{(k)} \ln\left(q_t^{(k)} - (\gamma_0^{(k)} + \psi^{(k)} y_{t-1}^{(k)})\right) - \lambda_t \left(\sum_{k=1}^{M} p^{(k)} q_t^{(k)} - I_t\right)$$

The first-order condition that maximises the above function is:

$$\begin{cases} \dfrac{\partial L}{\partial q_t^{(k)}} = \dfrac{\beta^{(k)}}{q_t^{(k)} - (\gamma_0^{(k)} + \psi^{(k)} y_{t-1}^{(k)})} - \lambda_t p^{(k)} = 0 \\ \dfrac{\partial L}{\partial \lambda_t} = \sum_{k=1}^{M} p^{(k)} q_t^{(k)} - I_t = 0 \end{cases}$$

For the k-th commodity, given income and commodity price, we can solve the above equations to obtain the optimal demand:

$$q_t^{(k)} = \gamma_0^{(k)} - \left(\beta^{(k)}/p^{(k)}\right) \sum_{k=1}^{M} p^{(k)} \gamma_0^{(k)} + \left(\beta^{(k)}/p^{(k)}\right) I_t$$

$$+ \psi^{(k)} y_{t-1}^{(k)} - \left(\beta^{(k)}/p^{(k)}\right) \sum_{k=1}^{M} p^{(k)} \psi^{(k)} y_{t-1}^{(k)}$$

Then, multiply $p^{(k)}$ on both sides of the above equation; $V_t^{(k)} = p^{(k)} q_t^{(k)}$ represents the consumption expenditure of the k-th category of goods (services):

$$V_t^{(k)} = a_t{}^{(k)} + \mu_t{}^{(k)} + \beta^{(k)} I_t$$

$$\alpha_t{}^{(k)} = \alpha_0^{(k)} - \beta^{(k)} \sum_{k=1}^{M} \psi^{(k)} p^{(k)} y_{t-1}^{(k)}, \ \alpha_0^{(k)} = p^{(k)} \gamma_0^{(k)} - \beta^{(k)} \sum_{k=1}^{M} p^{(k)} \gamma_0^{(k)}$$

$$\mu_t{}^{(k)} = \psi^{(k)} p^{(k)} y_{t-1}^{(k)}$$

$\alpha_0{}^{(k)}$ represents the consumer's total physiological needs for the k-th commodity, and $\mu_t{}^{(k)}$ is the habitual stock of consumption of the k-th commodity. To simplify the model, we assume that the habitual stock equals to the demand in the previous period ($\delta = 0$), that is, $y_{t-1} = q_{t-1}$ and $\mu_t{}^{(k)} = \psi^{(k)} p^{(k)} q_{t-1}^{(k)} = \psi^{(k)} V_{t-1}$.

The model is simplified to:

$$V_t^{(k)} = \alpha_t{}^{(k)} + \psi^{(k)} V_{t-1}^{(k)} + \beta^{(k)} I_t, \ \alpha_t{}^{(k)} = \alpha_0^{(k)} - \beta^{(k)} \sum_{k=1}^{M} \psi^{(k)} V_{t-1}^{(k)}$$

Representing the above model as a panel data model, we obtain (Wu & Han, 2021):

$$\mathrm{V}_{\mathrm{it}}^{(\mathrm{k})} = \alpha_{\mathrm{t}}{}^{(\mathrm{k})} + \psi^{(\mathrm{k})} \mathrm{V}_{\mathrm{i,t-1}}^{(\mathrm{k})} + \beta^{(\mathrm{k})} \mathrm{I}_{\mathrm{it}} + \mathrm{u}_{\mathrm{it}} \tag{6}$$

Model (6) is a dynamic panel ELES model embedded with internal habit formation theory. $V_{it}^{(k)}$ is the demand for the k-th commodity and I_{it} is the disposable income

in the i-th province in the t period. $\psi^{(k)}$ is the formation of internal habit. The intercept $\alpha_t{}^{(k)}$ has a time effect, composed of physiological needs ($\alpha_0^{(k)}$) and psychological needs ($\beta^{(k)} \sum_{k=1}^{M} \psi^{(k)} V_{t-1}^{(k)}$). The time effect of $\alpha_t{}^{(k)}$ portrays the time-varying nature of the physiological and psychological needs in different urban areas of China. Model (6) is a panel ELES model including internal habit formation, which shows that consumers' demand for the k-th commodity can be affected by habit formation and disposable income. Model (6) can analyse the differences in the habit formation of various consumption expenditures among different groups and regions and dynamically describe the time effects of physiological and psychological needs for various commodity.

We can draw two meaningful conclusions from Model (6). First, we can easily grasp the changing laws of consumer spending on a certain commodity in different groups or regions. Second, physiological needs have no connection with income level (economic development level), but can be influenced by habit-forming factors. Psychological needs are related to income level and habit formation. The influence of internal habits on consumption expenditure has a time effect, which leads to timeliness differences between psychological and physiological needs and proves that time effect exists in empirical study. Thus, the ELES Model (6), including internal habit formation, expands the theoretical connotation of the original model and simultaneously explains some causes of the time-varying nature of consumers' basic needs from the perspective of consumer behaviour.

4. Empirical results and analysis

4.1. Data source and description

All consumption structure data in this study were extracted from the 'China Statistical Yearbook' and the statistical yearbook of each province between 2002 and 2020. It is challenging to meet the conditions for estimating the freedom degree of the dynamic panel model due to missing data in some provinces and insufficient number of provinces in the central and western regions. From the perspective of income and consumption, there is little difference between China's central and western regions. Therefore, we selected 25 provinces and divided them into two regions based on their locations: the eastern and mid-western regions. The eastern region includes 10 provinces: Liaoning, Beijing, Tianjin, Shanghai, Zhejiang, Jiangsu, Guangdong, Fujian, Guangxi and Hainan. The mid-western region comprises 15 provinces: Inner Mongolia, Shanxi, Hubei, Henan, Anhui, Chongqing, Shaanxi, Jilin, Heilongjiang, Jiangxi, Sichuan, Ningxia, Xinjiang, Qinghai and Tibet.

In China, urban residents' consumption structure data has seven categories ($M = 7$): food, clothing, household equipment, medical care, transportation, education and culture, housing, and miscellaneous items. Moreover, the urban residents' consumer price index and classified price index of each province are used to respectively deflate the disposable income of urban residents and various consumption expenditures. Model (6) is used to empirically test the differences in the formation of internal habits and the dynamic changes of the urban residents psychological and physiological needs in the eastern and mid-western regions of China:

Table 1. Descriptive statistical results for sample data.

	The eastern region		The mid-western region	
Project	*I*	*V*	*I*	*V*
Mean	19406.89	4031.385	14051.51	2853.652
Median	17207.71	4038.149	11937.22	2802.691
Maximum	51997.99	6842.448	50420.82	5571.064
Minimum	6260.160	1873.082	6032.400	1517.000
Std. Dev	9852.511	1001.998	7403.260	764.9497
Skewness	1.168409	0.290612	2.017939	0.632180
Kurtosis	4.266158	2.707768	8.597038	3.316070
Observations	190	190	285	285

Source: self-created.

$$V_{it}^{(k)} = \alpha_t{}^{(k)} + \psi^{(k)} V_{i,t-1}^{(k)} + \beta^{(k)} I_{it} + u_{it} \tag{7}$$

$$\mathrm{k} = 1, 2, \ldots., 7; \mathrm{i} = 1, 2, \ldots., 25; \mathrm{t} = 2002,\ \ 2003, \ldots., 2020$$

where, k is the consumption type, i is the province, and t is the year. V_{it} represents the consumption expenditure(monetary unit: CNY) and I_{it} represents the per capita disposable income(monetary unit: CNY) of urban residents in the i-th province in year t. $V_{i,t-1}$ represents the consumption expenditure(monetary unit: CNY) of urban residents in the i-th province one period lagged behind. $\psi^{(k)}$ reflects the formation of urban residents' internal habits. To avoid the influence of endogeneity on the estimation results, this study adopts the systematic generalised moment estimation Model (7) and uses Sargan's test to estimate the instrumental variables. Table 1 shows the descriptive statistical results of the sample data for the eastern and mid-western regions. The sample data of the eastern and mid-western regions show obvious differences in various statistical indicators.

4.2. Empirical results of model (7)

This study uses $V_{i,t-2}$ as the instrumental variable in the seven model estimation processes and obtains the estimation results for the eastern and mid-western regions (Tables 2 and 3). Tables 2 and 3 show that their Sargan's p values are obviously greater than the significance level (= 0.05); therefore, we accept the hypothesis. This indicates that the instrumental variables are effective and the estimation method is reasonable. Finally, the time effect on internal habit formation can be calculated. In the estimation process, AR (1) and AR (2) terms were added to eliminate the autocorrelation problem in the model.

Urban residents in the eastern region of China have a habit formation effect in all seven consumption expenditure. However, the habit formation parameters of housing, transportation, culture and education are relatively large, and the marginal propensity of housing consumption expenditure is 0.026, which is the largest marginal propensity among the seven consumption expenditures. Moreover, the marginal propensities of transportation, culture and education are 0.003 and 0. 004. This shows that the housing consumption expenditure is the largest, and the consumption expenditure on transportation, culture and education is the most cautious. Additionally, it can be seen from

Table 2. The estimation results of the formation of various consumption habits and time effects of urban residents in the eastern region.

Project	Food	Clothing	Housing	Household equipment	Medical care	Transportation	Culture and education
ψ	0.601***	0.432***	0.824***	0.633***	0.339***	0.688***	0.676***
β	0.010***	0.007	0.026***	0.007***	0.019***	0.003***	0.004**
α_{2004}	−407.03***	80.22***	−287.85***	−101.4***	−105.81***	−751.59***	−422.90***
α_{2005}	−331.11***	58.86***	−350.03***	−118.5***	−96.97**	−638.36***	413.76***
α_{2006}	−281.82***	128.21***	−331.02***	−121.4***	−64.08**	−696.58**	−300.55***
α_{2007}	−235.63**	66.74***	−342.06***	−98.98***	−148.31***	−584.75***	−314.80***
α_{2008}	−147.45***	112.61***	−466.36***	−55.63***	−88.46***	−514.33***	−248.25***
α_{2009}	−34.72***	171.55***	−525.92**	−64.46***	−128.46***	−570.39***	−202.18***
α_{2010}	−34.47	111.54***	−608.10***	−33.78***	−144.10***	−466.56***	−117.27***
α_{2011}	−16.83	186.26***	−649.10***	41.78***	−216.12***	−394.83**	−18.192
α_{2012}	154.65***	174.43***	−732.34***	17.58***	−129.49***	−263.81***	56.277***
α_{2013}	288.26***	67.98***	−887.45***	22.53***	−165.12***	−165.71***	26.354
α_{2014}	−7.502	−92.98***	681.41*	−2.068	−217.02***	−363.43**	−174.08***
α_{2015}	297.52***	−72.52***	240.63***	12.91***	19.17	−225.70***	−123.42***
α_{2016}	232.56***	−21.08***	590.72***	28.02***	−26.69*	−294.56***	−251.85***
α_{2017}	387.33***	−7.95***	845.35***	103.45***	54.87***	49.70*	−185.16***
α_{2018}	656.52***	−24.86***	1200.05***	110.05***	15.96	105.95***	−322.87***
α_{2019}	889.16***	−13.60***	2195.67***	143.51***	204.95***	344.75***	−373.67***
α_{2020}	−169.66***	−58.88***	−1024.60**	205.70***	215.90	398.34***	1542.03***
Sarga-n(test) (P)	0.43	0.35	0.69	0.70	0.81	0.38	0.37
AR (1)	–	0.87	–	–	–	–	–
AR(2)	–	0.83	–	–	–	–	–

Note: The software used was Eviews8.0, and *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. The numbers corresponding to AR (1) and AR (2) are the P value of the model residual sequence correlation diagnosis. '–' represents that the model section adopts (orthogonal deviation, Therefore, the serial correlation test of residuals is invalid.
Source: self-created.

Table 3. The estimated results of the formation of various consumption habits and time effect of urban residents in the mid-western region.

Project	Food	Clothing	Housing	Household equipment	Medical care	Transportation	Culture and education
ψ	0.661***	0.761***	0.419***	0.579***	0.786***	0.576***	0.76***
β	0.012***	0.004***	0.022***	0.004***	0.005***	0.003**	0.009***
α_{2004}	−276.41***	−194.75***	−1030.58***	−248.66***	−168.00***	−424.96***	−252.19***
α_{2005}	−268.01***	−186.72***	−1053.12***	−277.59***	−164.20***	−382.33***	−250.36***
α_{2006}	−242.39***	−103.54***	−1059.11***	−241.75***	−110.64***	−420.50***	−168.52***
α_{2007}	−261.08***	−115.33***	−1050.33***	−231.90***	−163.77***	−386.38***	−183.47***
α_{2008}	−79.84	−20.63	−1084.56***	−191.26***	−111.98***	−376.54***	−83.67***
α_{2009}	−46.16	−25.55**	−1038.38***	−187.98***	−72.58***	−434.10***	−90.92***
α_{2010}	−34.63*	−25.15*	−1075.31***	−173.22***	−82.49***	−388.60***	−46.25***
α_{2011}	−19.28*	95.17***	−1041.42***	−114.59***	−134.81***	−346.48***	36.04***
α_{2012}	152.27***	166.11***	−1117.26***	−80.21***	−84.49***	−267.64***	105.98***
α_{2013}	219.27***	174.15***	−1133.76***	−62.62***	−63.46***	−272.25***	97.99***
α_{2014}	38.84*	71.86***	−721.04***	−69.97***	−72.69***	−150.77***	−34.89**
α_{2015}	6.673**	−50.52***	385.71***	−63.52***	−26.41***	−269.66***	−158.12***
α_{2016}	203.74***	51.58***	9.694	−61.69***	27.03***	−102.92***	−42.49***
α_{2017}	308.41***	74.19***	260.95***	21.13***	44.42***	−25.27***	−41.91***
α_{2018}	526.38***	136.67***	558.61***	57.48***	−29.36***	23.62***	−4.72
α_{2019}	723.20***	227.35***	1258.25***	154.11***	98.79***	111.53***	33.26***
α_{2020}	103.19***	385.51***	−27.86	284.55***	297.23***	695.59***	1007.01***
Sarga-n(test) (P)	0.12	0.42	0.35	0.49	0.33	0.42	0.59
AR (1)	–	–	–	–	–	0.53	–
AR(2)	–	–	–	–	–	0.37	–

Note: The software used was Eviews8.0, and *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. The numbers corresponding to AR (1) and AR(2) are the P value of the model residual sequence correlation diagnosis. '–' represents what the model section adopts (Orthogonal deviation). Therefore, the serial correlation test of residuals is invalid.
Source: self-created.

Table 2 that the medical care habit formation parameter is the smallest, which also shows that the consumption expenditure on medical care is not large.

As seen from Table 3, urban residents in the mid-western region of China also have habit formation effect in the seven types of consumption expenditure. Still, the habit formation parameters of medical care, clothing, culture and education are the largest, while the habit formation parameter of housing consumption expenditure is the smallest. Furthermore, the habit formation coefficient and the marginal propensity of food consumption are relatively large, which indicates that the urban residents in the mid-western region of China have relatively large consumption expenditures on food.

Thus, urban residents in the eastern region of China have a relatively large habit formation coefficient for housing, transportation, culture and education, and a relatively large propensity for housing, household equipment, and medical care. Urban residents in the mid-western region have a relatively large coefficient of habit formation for clothing, medical care, culture and education as well as a relatively large marginal propensity for food and housing. This shows that urban residents in the mid-western region of China spend a relatively large amount on subsistence (food and housing) and are cautious on the consumption of clothing, medical care, culture and education. Urban residents in the eastern region spend more on development and enjoyment.

From model (7), we can obtain the time effect ($\alpha_t{}^{(k)}$) of urban residents' internal habit formation among seven types of consumption expenditures in eastern and mid-western regions of China. According to the meaning of $\alpha_t{}^{(k)} = \alpha_0^{(k)} - \beta^{(k)} \sum_{k=1}^{M} \psi^{(k)} V_{t-1}^{(k)}$, which is composed of $\alpha_0^{(k)}$ (physiological needs) and $\beta^{(k)} \sum_{k=1}^{M} \psi^{(k)} V_{t-1}^{(k)}$ (psychological needs), we can calculate the effect of psychological needs in the t-th year using the internal habit formation parameter ($\psi^{(k)}$) and the marginal propensity ($\beta^{(k)}$) of urban residents' consumption in Table 2. We can calculate the physiological needs ($\alpha_0^{(k)}$) for each year from Tables 2 and 3. Finally, we obtained the effect diagrams of physiological and psychological needs among urban residents' seven types of consumption expenditures in the eastern and mid-western regions of China from 2004 to 2020 (Figures 1–14).

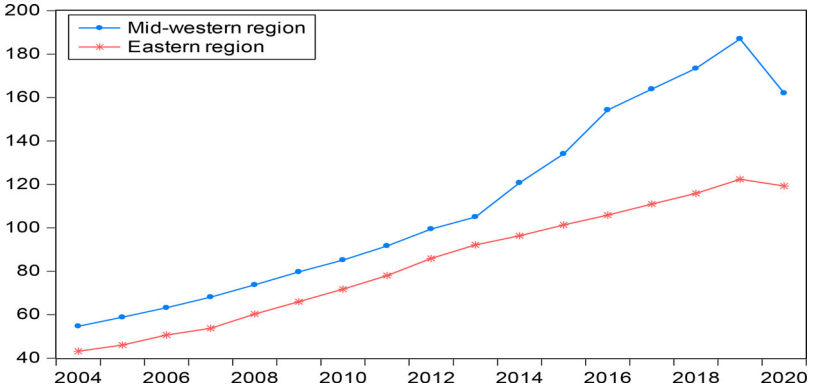

Figure 1. Changes in the psychological needs of food consumption in the eastern and mid-western regions.
Source: self-created.

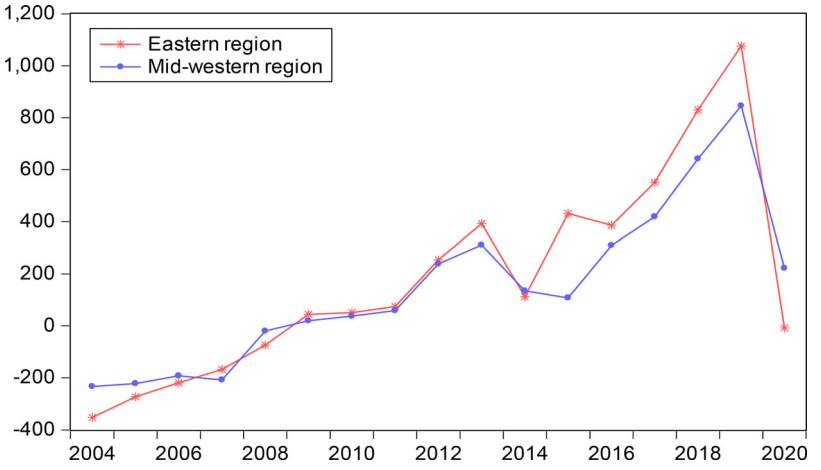

Figure 2. Changes in physiological needs for food consumption in the eastern and mid-western regions.
Source: self-created.

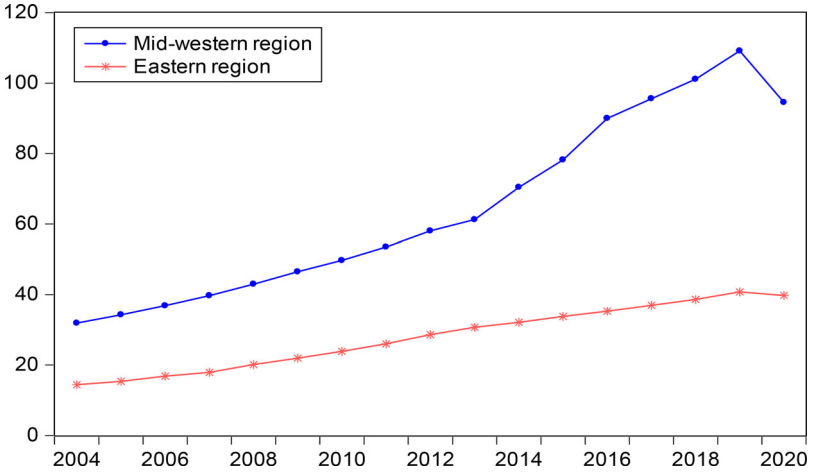

Figure 3. Changes in the psychological needs of clothing consumption in the eastern and mid-western regions.
Source: self-created.

Figures 1 and 2 show the changes in the psychological and physiological needs of food consumption expenditure in eastern and mid-western regions of China from 2004 to 2020. Over the past decade, urban residents' psychological need for food consumption in China has increased greatly, and in the mid-western region the psychological need is greater than that in the eastern region. It was relatively similar in terms of physiological need, which has little changes in urban areas between the eastern and mid-western regions. It can also be seen from Figures 1 and 2 that both the psychological and physiological needs for food have declined significantly since 2019.

As shown in Figures 3 and 4, for urban residents' psychological needs of clothing consumption expenditure, mid-western region has greater psychological needs and bigger growth rate than eastern region. And the eastern region has not changed

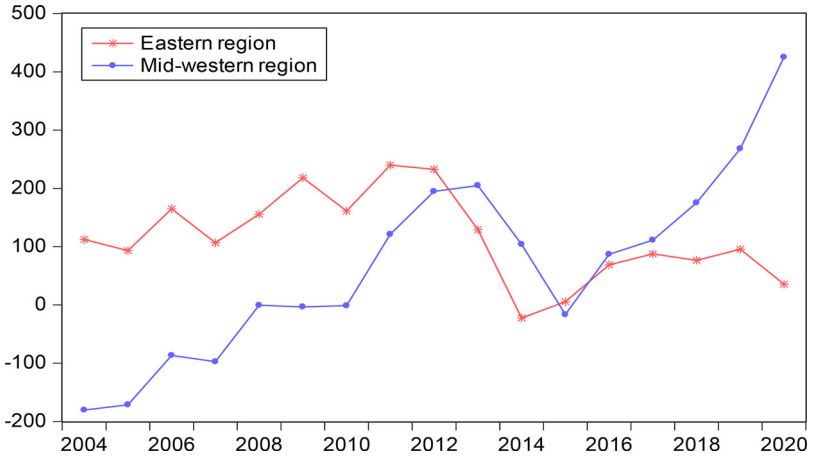

Figure 4. Changes in the physiological needs for clothing consumption in the eastern, mid-western regions.
Source: self-created.

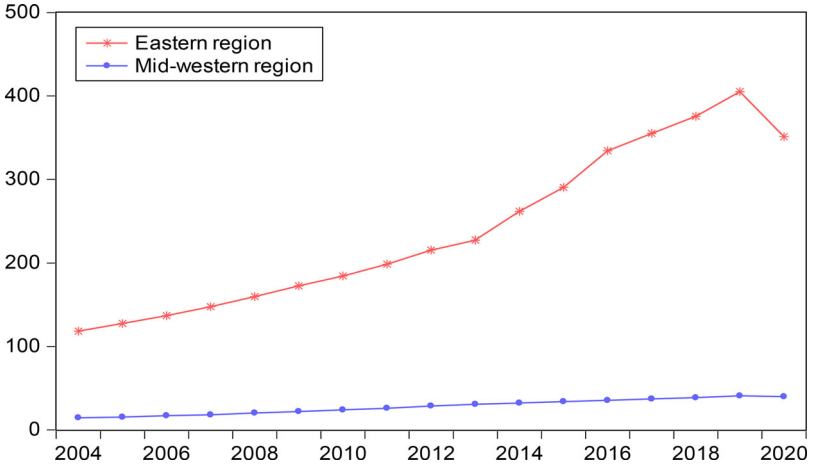

Figure 5. Changes in the psychological needs for housing consumption in the eastern and mid-western regions.
Source: self-created.

much in the past decade as its growth has been in a slow speed. As for urban residents' physiological needs for clothing consumption, the eastern region had greater physiological needs than the mid-western region before 2012. While this situation changed in 2012. The urban residents' physiological needs in mid-western region have been mostly bigger than those in eastern region, and have kept a fast growth since 2016. But the urban residents' physiological needs in eastern region have a year-by-year downtrend.

Figures 5 and 6 show that the psychological needs of urban residents' housing consumption expenditure in the eastern region have been always greater than those in the mid-western region in the past decade. Specifically, the psychological needs of urban residents in the mid-western region for housing consumption expenditure have

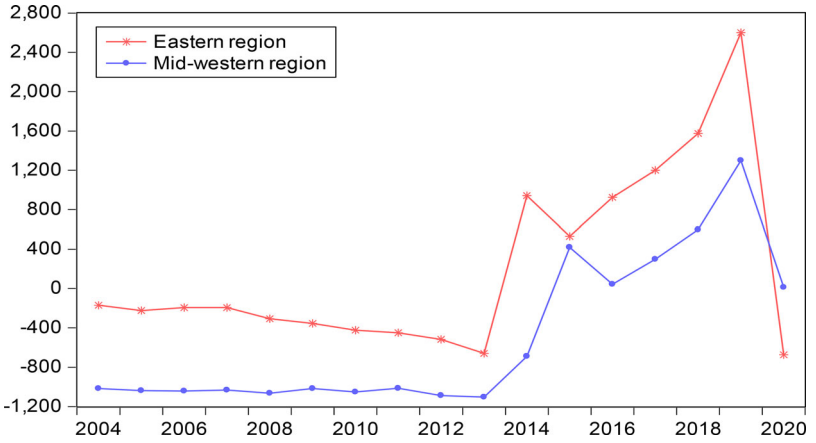

Figure 6. Changes in physiological needs for housing consumption in the eastern and mid-western regions.
Source: self-created.

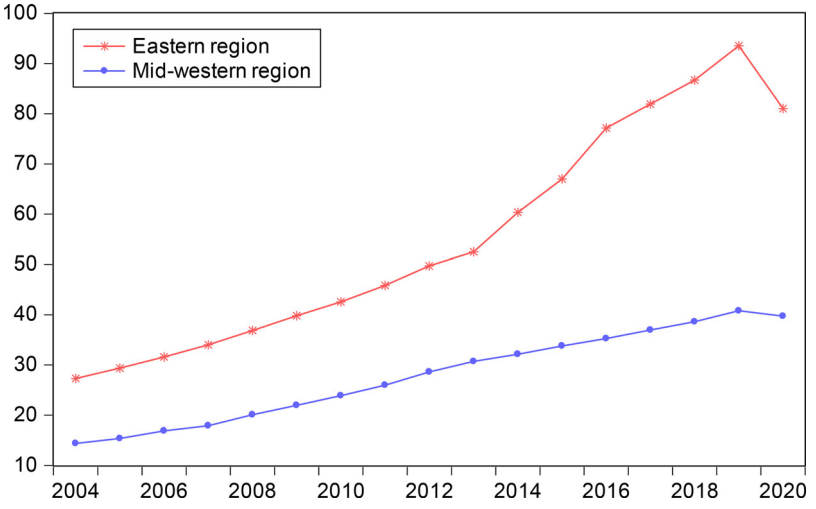

Figure 7. Changes in psychological needs for household equipment consumption in the eastern and mid-western regions.
Source: self-created.

not changed much. Conversely, the psychological needs of urban residents in the eastern region have increased greatly.

From Figure 7, we can find there is a growing gap in the psychological needs for household equipment consumption between urban residents in the eastern and mid-western regions. As shown in Figures 7 and 8, urban residents in the eastern region have had greater psychological and physiological needs than those who in the mid-western region in the past decade. However, the gap in physiological needs has decreased and finally overlapped in 2019. This shows that with the increase of income, Chinese urban residents in more developed eastern region have higher psychological needs and even stronger desire for high-quality household equipment.

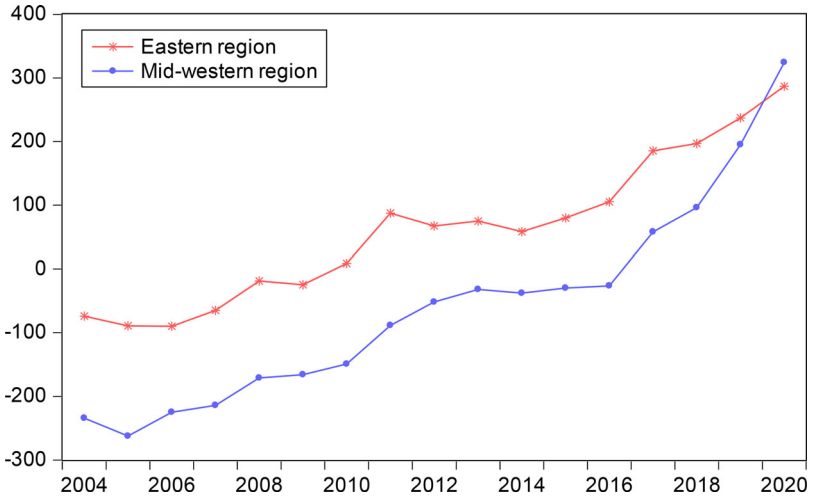

Figure 8. Changes in physiological needs for household equipment consumption in the eastern and mid-western regions.
Source: self-created.

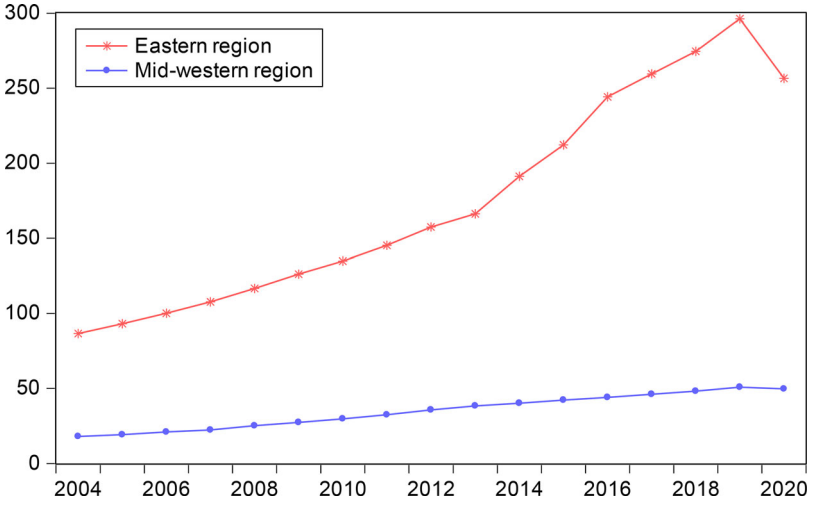

Figure 9. Changes in the psychological needs for medical care consumption in the eastern and mid-western regions.
Source: self-created.

Figures 9 and 10 show that the psychological and physiological needs of urban residents' medical care consumption expenditure in the eastern region are relatively larger. The psychological need for medical care expenditure in the eastern region has grown rapidly in the past decade. Simultaneously, whether in the eastern or mid-western regions, the physiological needs for medical care consumption expenditure did not change much before 2013, but the physiological needs in eastern region have increased substantially since 2013. This shows that urban residents in the eastern region of China have a greater need for medical care. High-income residents in China's relatively more developed eastern region have higher medical care and insurance needs.

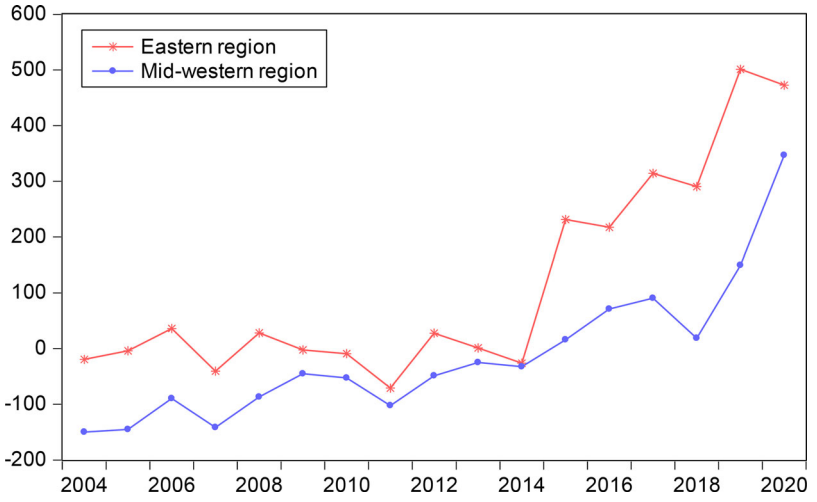

Figure 10. Changes in the physiological needs for medical care consumption in the eastern and mid-western regions.
Source: self-created.

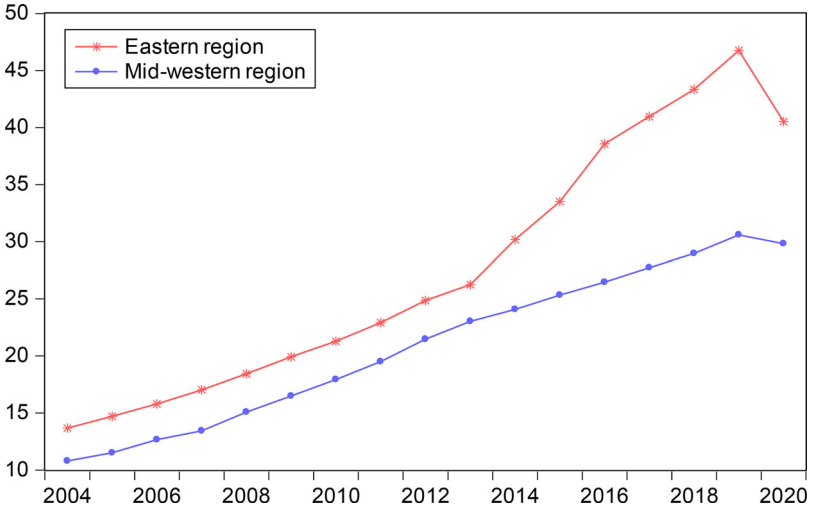

Figure 11. Changes in the psychological needs for transportation consumption in the eastern and mid-western regions.
Source: self-created.

Figures 11 and 12 show that urban residents in the eastern region have significantly higher psychological need for transportation consumption expenditure than those who in the mid-western region. Before 2012, urban residents in the mid-western region had a comparatively greater physiological need. Since 2012, the physiological needs of the two regions in transportation consumption expenditure have not been quite different, and the two have risen alternately.

As Figure 13 shows, the psychological need for cultural and educational consumption expenditure in the mid-western region is much greater than that in the eastern region. The eastern region's psychological need for cultural and educational

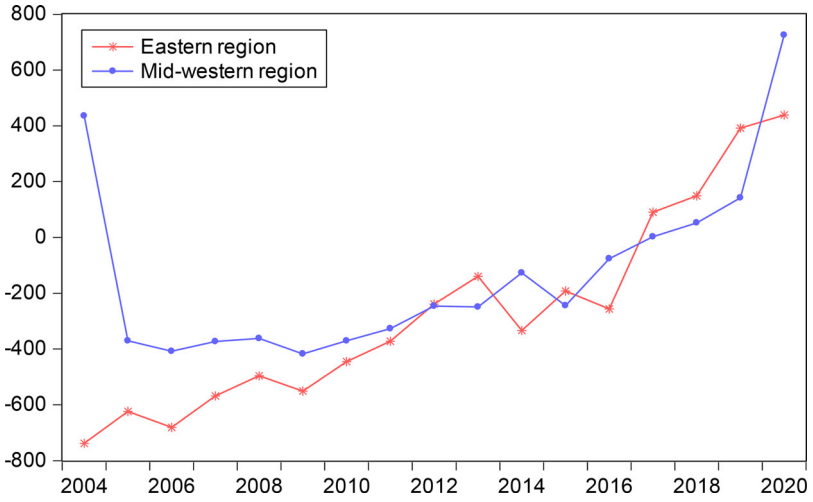

Figure 12. Changes in the physiological needs for transportation consumption in the eastern and mid-western regions.
Source: self-created.

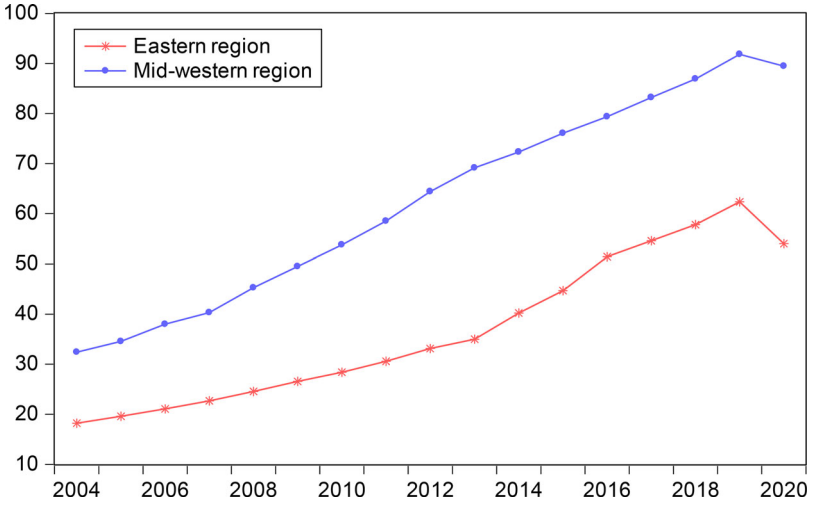

Figure 13. Changes in the psychological needs of cultural and educational consumption in the eastern and mid-western regions.
Source: self-created.

consumption expenditure has not changed much and has been at a lower level in the past decade. The gap between the mid-western region and eastern region has been expanding. Figure 14 shows that in the past decade, urban residents in the mid-western region have a greater physiological need for culture and education than those who in the eastern region, which shows that there are still large differences in education among the different areas in China.

The psychological needs for housing, household equipment, medical care, and transportation in the eastern region are greater than those in the mid-western region. However, their psychological needs for food, clothing, culture and education are

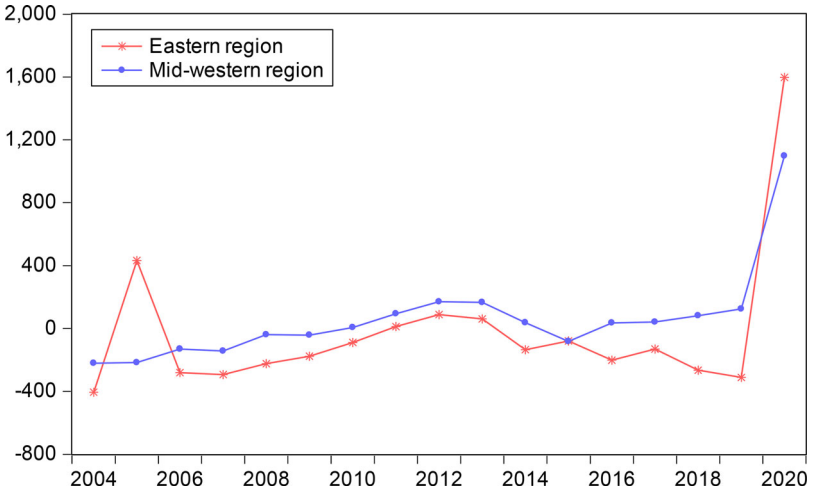

Figure 14. Changes in the physiological needs for cultural and educational consumption in the eastern and mid-western regions.
Source: self-created.

lower. Since 2013, an expanding trend and a noticeable timeliness gap have existed in the psychological needs of various commodities between the two regions. Although the economic development level and per capita income level in the eastern region are comparatively higher, the physiological needs of urban residents for various consumption expenditures in the eastern region are not always larger than those in the mid-western region. It means that in addition to the level of regional economic development (income), regional consumption habits also have a greater impact on psychological and physiological needs.

5. Conclusions and recommendations

5.1. Conclusions

The model results show that urban residents in different regions of China have habit formation effects on the seven types of consumption expenditure. Urban residents in the eastern region have relatively large habit formation parameters for housing, transportation, culture and education, the largest housing consumption expenditure and the most cautious expenditure on transportation, culture and education. Urban residents in the mid-western region have the largest habit formation parameters in clothing, medical care, culture and education and the largest consumption expenditure on food, culture and education, and housing. Generally, urban residents in developed eastern region spend relatively large amounts on development and enjoyment consumption. In contrast, urban residents in the mid-western region spend relatively large amounts on subsistence consumption.

Psychological needs are consumers' emotional and self-realisation needs, reflecting through reactions and interactions from other people. Therefore, psychological needs are affected by consumers' income, personal past consumption habits and various regional factors, including regional culture and customs. As components of basic

needs, psychological and physiological needs differ significantly in different regions and periods. Psychological and physiological needs can be affected by regional economic development (income) level and regional consumption habits. Through mathematical model construction, this study depicts the psychological and physiological needs of urban residents differ between the eastern and mid-western regions in various commodity expenditures at different time points. This study also dynamically describes the time-varying characteristics of the psychological and physiological needs of urban residents in different regions for various commodity expenditures. The empirical results show that regional differences in the psychological needs of various commodities are relatively obvious. The geographical differences in physiological needs are not large, but the changes' timeliness is relatively large.

The COVID-19 pandemic has a great impact on the basic needs of urban residents by reducing the psychological needs of various commodity expenditures. Physiological needs, such as survival demands, have nothing to do with income levels and are not significantly affected by the epidemic. In fact, the epidemic affects individuals' income levels and consumption habits, thereby affects their psychological needs for various commodities.

5.2. Recommendations

The following policy recommendations are proposed.

First, government should implement more detailed consumption policies in response to the consumers' preferences in different regions. As the eastern and mid-western regions have different preferences and consumption habits for various commodities, more detailed consumption policies can be implemented according to the consumption habits and marginal propensities of different types of commodities in different regions.

Second, government should tap commodity consumption that has increased psychological needs and unleash the potential of regional consumption. The eastern region has the greatest psychological need for housing and medical care consumption. Conversely, the mid-western regions have the greatest psychological need for clothing and cultural and educational consumption expenditures. Government should optimise the industrial structure, adjust the consumption product structure, develop higher-level, exquisite, and personalised product supplies in different regions to meet the psychological needs for high-quality products, release regional purchasing power, and promote consumption growth.

Third, government should ensure the consumption of commodities with increased physiological needs to meet urban residents' basic needs. For different regions, the government can vigorously strengthen basic public services such as housing, transportation, and medical care, increase urban residents' income in the mid-western regions, and meet the physiological needs of different commodities consumption.

Fourth, government should enhance the consumption cultivation and supports on consumption policies of low-income groups and promote the growth of urban residents' consumption in the mid-western region. They have a large consumption marginal propensity, but their income is low, and their consumption potential is huge.

They have a huge psychological need for food, clothing, housing, and medical care. Therefore, government must increase consumption cultivation and supports on the consumption policies, increase the supply of cheap and high-quality goods, alleviate the structural contradiction between income and commodity supply, and promote consumption growth in the mid-western region.

Future research

As a behavioural equation for studying residents' consumption, the model in this study can be extended to study and analyse the changes in the psychological and physiological needs of different social classes, incomes, and occupations in the consumption expenditure of various commodities.

Disclosure statement

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References

Ahmed, N., Levorato, M., & Li, G. P. (2018). Residential consumer-centric demand side management. *IEEE Transactions on Smart Grid*, *9*(5), 4513–4524. https://doi.org/10.1109/TSG.2017.2661991

Ahmed, S. (1986). Temporary and permanent government spending in an open economy: Some evidence for the United Kingdom. *Journal of Monetary Economics*, *17*(2), 197–224. https://doi.org/10.1016/0304-3932(86)90028-0

Ai, C., & Wang, W. (2008). The excessive sensitivity of Chinese residents' consumption under habitual preferences: An analysis based on inter-provincial dynamic panel data from 1995 to 2005. *Quantitative Economics and Technical Economics Research*, *25*, 98–114. https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD2008&filename=SLJY200811008&uniplatform=NZKPT&v=g5JF9qEMrgh1MJYPHQvAhMoOTWMhB5JLbDwq6XpmkbcpFT7OTfXeyzuI6LpP4REA

Alessie, R., & Lusardi, A. (1997). Saving and income smoothing: Evidence from panel data. *European Economic Review*, *41*(7), 1251–1279. https://doi.org/10.1016/S0014-2921(96)00023-2

Alessie, R., & Teppa, F. (2010). Saving and habit formation: Evidence from Dutch panel data. *Empirical Economics*, *38*(2), 385–407. https://doi.org/10.1007/s00181-009-0272-z

Baudrillard, J. (1998). *The consumer society: Myths and structures*. Sage.

Bhatt, V., Kishor, K., & Marfatia, H. (2017). *Estimating excess sensitivity and habit persistence in consumption using green book forecast as an instrument* [MPRA Paper No. 79748]. https://doi.org/10.2139/ssrn.2988043

Chen, C. (2011). The dynamic evolution of the influence of government spending on consumers demand. *Statistical Research*, *28*(05), 13–20. https://doi.org/10.19343/j.cnki.11-1302/c.2011.05.002

Chen, H., & Song, M. (2019). Research on the influence of habit formation on the consumption structure of urban residents in my country. *Journal of Shandong University (Philosophy and Social Sciences Edition)*, *1*, 25–33.

Chetty, R., & Szeidl, A. (2016). Consumption commitments and habit formation. *Econometrica*, *84*(2), 855–890. https://doi.org/10.3982/ECTA9390

Cui, H., & Fan, J. (2011). The formation of internal and external habits and the consumption behaviours of Chinese rural residents. *Chinese Rural Economy*, *07*, 54–62.

Desbouys, L., De Ridder, K., Rouche, M., & Castetbon, K. (2019). Food consumption in adolescents and young adults: Age-specific socio-economic and cultural disparities (Belgian food consumption survey 2014). *Nutrients*, *11*(7), 1520. https://doi.org/10.3390/nu11071520

Ding, R., & Zhu, B. (2013). Regional differences in influencing factors of residents' consumption – An empirical analysis based on panel data in my country's eastern central and western regions. *Consumer Economy*, *29*, 9–12.

Duesenberry, J. S. (1949). Income, saving, and the theory of consumer behaviour. *Review of Economics & Statistics*, *33*(3), 111. https://doi.org/10.2307/1926590

Gardner, B., Rebar, A. L., & Lally, P. (2019). A matter of habit: Recognising the multiple roles of habit in health behaviour. *British Journal of Health Psychology*, *24*(2), 241–249. https://doi.org/10.1111/bjhp.12369

Geng, Y. (2012). An empirical analysis of the impact of consumption environment on the consumption of rural residents in my country. *Statistical Research*, *29*, 36–40.

Goh, T.-T., Xin, Z., & Jin, D. (2019). Habit formation in social media consumption: A case of political engagement. *Behaviour & Information Technology*, *38*(3), 273–288. https://doi.org/10.1080/0144929X.2018.1529197

Han, L. Y., & Du, C. Y. (2011). Regional difference of the impact of urban households' consumer finance. *Economic Research Journal*, *46*(S1), 30–42.

Han, L. Y., & Du, C. Y. (2012). Regional difference, urban and rural income inequality, credit level and consumption. *Economic Research Journal*, *47*(S1), 15–27.

Hang, B. (2009). Households' buffer-stock saving with habit formation. *Rural Economic Research*, *44*, 96–105.

Hang, B. (2010). Why are Chinese urban residents APC keep decreasing? *Quantitative Economics and Technical Economics Research*, *27*, 126–138. http://en.cnki.com.cn/Article_en/CJFDTOTAL-SLJY201006012.htm

Hang, B., & Shen, C. L. (2009). Study for precautionary savings motive of urban residents in the developed areas – The empirical study based on micro-data. *Journal of Shanxi Finance and Economics University*, *31*(06), 23–30.

Hang, B., & Yan, X. H. (2013). Residents' consumption behaviour during the period of rapid economic growth: An empirical analysis based on the formation of habits. *Quarterly Journal of Economics*, *12*, 1191–1208.

Holt, M. T., & Goodwin, B. K. (1997). Generalised habit formation in an inverse almost ideal demand system: An application to meat expenditures in the U.S. *Empirical Economics*, *22*(2), 293–320. https://doi.org/10.1007/BF01205360

Huang, Y., & Zong, Q. (2014). Habit formation effect of consumption of Chinese urban residents. *Economic Research*, *49*, 17–28.

Jia, N., Zhang, L., & Gan, L. (2011). Habit formation' test of rural household food consumption under uncertainty. *Quarterly Journal of Economics*, *11*, 327–348. https://doi.org/10.13821/j.cnki.ceq.2012.01.015

Jung, S. E., & Bice, C. (2019). The role of self-identity in predicting college students' intention to consume fruits and vegetables. *Journal of Nutrition Education and Behavior*, *51*(2), 173–181. https://doi.org/10.1016/j.jneb.2018.07.015

Karras, G. (1994). Government spending and private consumption: Some international evidence. *Journal of Money, Credit, and Banking*, *26*(1), 9–22. https://doi.org/10.2307/2078031

Kapteyn, A., Geer, S. V. D., & Wansbeek, S. T. (1997). Interdependent preferences: An econometric analysis. *Journal of Applied Econometrics*, *12*(6), 665–686. https://doi.org/10.1002/(SICI)1099-1255(199711/12)12:63.0.CO;2-U

Korniotis, G. M. (2010). Estimating panel models with internal and external habit formation. *Journal of Business & Economic Statistics*, *28*(1), 145–158. https://doi.org/10.1198/jbes.2009.08041

Klein, L. R., & Rubin, H. (1947). A constant-utility index of the cost of living. *The Review of Economic Studies*, *15*(2), 84–87. https://doi.org/10.2307/2295996

Lei, Q. L. (2009). Wealth accumulation habits preference changes uncertainty and consumption decisions. *China Economic Quarterly*, *8*(3), 1029–1046.

Li, G. (2005). Government expenditure and resident consumption: Substitution or complementarity. *World Economy*, *5*, 38–45.

Li, X., Wang, X., & Gao, W. (2008). An empirical study on the consumption structure of Beijing's migrant workers based on the ELES model. *Agricultural Economics*, (*29*(4), 52–57. https://doi.org/10.1080/01650420701882988

Liu, L. (2017). Habit formation and retirement shock with urban residents' consumption structure. *Statistics and Information Forum*, *32*, 89–97.

Lluch, C., & Williams, R. (1975). Consumer demand systems and aggregate consumption in the U.S.A: An application of the extended linear expenditure system. *The Canadian Journal of Economics*, *8*(1), 49–66. https://doi.org/10.2307/134064

Long, Z. H., Wang, X. H., & Sun, Y. (2002). An empirical analysis on Chinese urban residents' consumption habit formation. *Economic Science*, *6*, 29–35. https://doi.org/10.19523/j.jjkx.2002.06.004

Maček, A., Ovin, R., Divjak, M., Skoko, H., & Horvat, T. (2021). Foreign direct investments' openness in local communities – The case of Slovenia and Serbia. *Economic Research-Ekonomska Istraživanja*, *34*(1), 1013–1032. https://doi.org/10.1080/1331677X.2020.1819848

Muraviev, R. (2011). Additive habit formation: Consumption in incomplete markets with random endowments. *Mathematics and Financial Economics*, *5*(2), 67–99. https://doi.org/10.1007/s11579-011-0049-y

Phlips, L. (1972). A dynamic version of the linear expenditure model. *The Review of Economics and Statistics*, *54*(4), 450–458. https://doi.org/10.2307/1924573

Pollak, R. A. (1970). Habit formation and dynamic demand functions. *Journal of Political Economy*, *78*(4, Part 1), 745–763. http://www.onacademic.com/detail/journal_1000009419652099_7942.html. https://doi.org/10.1086/259667

Pollak, R. A. (1976). Interdependent preferences. *American Economic Review*, *66*, 309–320.

Qi, F. Q., & Wang, Z. W. (2007). An empirical analysis of the consumption habits of rural residents in Beijing. *Chinese Rural Economy*, *7*, 53–59. https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD2007&filename=ZNJJ200707008&uniplatform=NZKPT&v=A0K71DMt9dB6b4xeHMUooFvW_43Hzy1f0gWigRTcVllFl80OjIXQ7EhAxue86kV1

Schclarek, A. (2004). *Consumption and Keynesian fiscal policy*. Social Science Electronic Publishing (10). https://xueshu.baidu.com/usercenter/paper/show?paperid=cec82719b875222ffb561429f5b4372c&site=xueshu_se&hitarticle=1

Stone, R. (1954). Linear expenditure systems and demand analysis: An application to the pattern of British demand. *The Economic Journal*, *64*(255), 511–527. https://doi.org/10.2307/2227743

Veenhoven, R. (1996). Happy life-expectancy. *Social Indicators Research*, *39*(1), 1–58. https://doi.org/10.1007/BF00300831

Verhelst, B., & Van den Poel, D. V. (2014). Deep habits in consumption: A spatial panel analysis using scanner data. *Empirical Economics*, *47*(3), 959–976. https://doi.org/10.1007/s00181-013-0776-4

Wang, K., & Liu, J. (2011). The application of multi-level model in the research of regional consumption difference. *Statistical Research*, *28*, 84–90.

Wang, X. H., Wen, T., & Zhu, J. (2016). Evolution research on habit formation, income structure imbalance and rural residents' consumption behaviour. *Economic Perspectives*, *10*, 39–49.

Wu, X. (2014). Marketization circulation facilities environment and rural consumption structure – An empirical analysis based on the enter-provincial panel data model. *Economic Issues*, *10*, 75–80.

Wu, X. (2015). Evaluation of the dual structure of circulation and its dynamic impact on rural consumption. *Statistics and Decision*, *5*, 125–128.

Wu, X., & Han, J. (2021). Psychological needs, physiological needs and regional comparison effects. *Sustainability*, *13*(16), 9464. https://doi.org/10.3390/su13169464

Xu, C. H., & Gong, W. J. (2020). Medical condition, population density, and residents' savings in China's contiguous destitute areas. *Economic Research-Ekonomska Istraživanja*, *33*(1), 652–671. https://doi.org/10.1080/1331677X.2019.1668284

Yan, L., Keh, H. T., & Wang, X. (2021). Powering sustainable consumption: The roles of green consumption values and power distance belief. *Journal of Business Ethics*, *169*(3), 499–516. https://doi.org/10.1007/s10551-019-04295-5

Yan, X. H., & Hang, B. (2010). Internal and external habit formation with household consumption structure: An empirical study based on Chinese rural household. *Statistical Research*, *27*(05), 32–40. doi.org/ https://doi.org/10.19343/j.cnki.11-1302/c.2010.05.006

Yang, Q., & Yin, H. B. (2017). An empirical study on the impact of infrastructure investment and structure and regional difference on the consumption of rural residents. *Consumer Economics*, *33*(04), 26–33.

Zhai, T. C., & Hu, B. C. (2017). Research on the evolution of the effect of the habit formation of rural residents' food consumption. *Chinese Rural Economy*, *8*, 61–74.

Zhai, T., Long, W., & Si, W. (2021). The evolution of habit formation effect on sugar consumption of urban residents in China. *China Agricultural Economic Review*, *13*(3), 548–568. https://doi.org/10.1108/CAER-07-2020-0170

Zhang, A., & Ling, C. (2015). Research on the precautionary savings of Chinese urban and rural residents under the habit formation. *Statistical Research*, *32*, 23–30.

Zhang, Z. J. (2006). Analysis of dynamic effect of Chinese government expenditure on residents' consumption. *Consumer Economics*, *22*(06), 16–18.

Zhao, W. Y., & Yuan, J. J. (2013). Study on the reason of the consumption growth difference among provinces' urban residents in China. *Statistical Research*, *30*(08), 77–83. https://doi.org/10.19343/j.cnki.11-1302/c.2013.08.011

Zhou, L., & Zhang, J. (2019). The evolving trends and regional differences of China's urban household consumption inequality. *Financial and Trade Economy*, *40*, 143–160.