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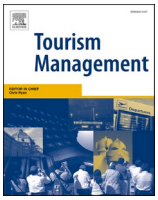

Housing wealth, mortgage debt, and tourism demand: Navigating urban-rural institutional divides and financial constraints in the context of China

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ABSTRACT

The relationship between housing markets and tourism demand involves a tension between the stimulating "wealth effect" and the constraining "crowding-out effect" of mortgage debt. Crucially, this dynamic depends on institutional environment. Using China Family Panel Studies data (2014–2020) and the Exact Affine Stone Index demand system, this study analyzes how this tension varies across China's urban-rural institutional divide. Findings reveal stark institutional disparities. Urban housing wealth (characterized by high liquidity) significantly boosts tourism's budget share; this effect is muted and conditional for rural households (characterized by illiquid assets). Crucially, mortgage debt exerts a potent crowding-out effect, dampening tourism spending as income rises. Urban tourism demand follows complex income patterns and is price-elastic, while rural tourism grows proportionally with income and is inelastic. Results underscore the need to integrate institutional context and financial constraints alongside wealth when analyzing discretionary consumption like tourism in rapidly evolving economies.

1. Introduction

The transition from essential to discretionary consumption, particularly tourism, is a hallmark of economic development worldwide. As households move beyond subsistence, understanding the drivers of this demand becomes crucial. While early research focused primarily on disposable income, the attention of scholars globally has shifted toward the dual role of housing, which serves simultaneously as a significant component of household wealth and a major source of household debt.

In this context, the relationship between housing and tourism consumption is characterized by a tension between two countervailing economic forces. On one hand, the "housing wealth effect," grounded in the Life-Cycle Hypothesis (Modigliani & Brumberg, 1954), suggests that rising property values increase perceived lifetime resources, thereby stimulating spending on luxury goods like tourism. On the other hand, the global surge in housing prices has led to a "crowding-out effect," where high mortgage burdens constrain liquidity, forcing households to divert funds away from discretionary travel (Campbell & Cocco, 2007). However, a critical gap remains in the general literature: how do varying institutional frameworks, specifically regarding property rights and asset liquidity, moderate this tension?

China serves as an exemplary empirical setting to investigate these universal dynamics due to its profound institutional heterogeneity. Since the initiation of economic reforms in 1978, Chinese households have experienced substantial income growth, triggering the same shift toward discretionary spending observed elsewhere. Domestic tourism revenue surged 55-fold between 1994 and 2019, reflecting an annual growth rate of nearly 11 % (National Bureau of Statistics of China, 1995, 2020), while China simultaneously became the world's largest spender on international tourism (World Tourism Organization, 2019). Concurrently, data from the China Family Panel Studies (CFPS) indicates that housing constitutes the cornerstone of wealth for Chinese families, accounting for nearly 70 % of household assets by 2019. With average housing values significantly outpacing disposable income (Li, 2018), the

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potential for a housing wealth effect on consumption, particularly discretionary spending like tourism, is substantial (Bostic et al., 2009; Zuo & Lai, 2020). However, critical gaps remain in understanding the nuances of this relationship. The impact of housing wealth is not uniform; it is filtered through profound institutional divides. Through housing privatization reforms beginning in 1998, urban China developed tradable property rights, whereas rural dwellings remain collectively owned and can only be traded within the village collective. It is further complicated by a competing 'crowding-out effect' from significant mortgage debt (Šergo et al., 2023). High debt-to-income ratios (DTI) impose a financial constraint on households, forcing them to divert funds away from discretionary goods. This study, therefore, moves beyond a simple wealth effect analysis to investigate the interplay between housing as an asset and debt as a constraint.

This paper investigates the nuanced relationship between housing wealth, debt, and tourism demand in China. To do so, we pose the following research questions: How do housing wealth and mortgage debt, filtered through the institutional divide in property rights and asset liquidity, differentially affect tourism budget shares for urban versus rural households in China? What are the relationships between income and tourism expenditure for urban and rural households, and what do these patterns reveal about the nature of tourism as a consumption good?

To answer these questions, this study utilizes national household-level data from the CFPS for 2014, 2016, 2018, and 2020, explicitly segmenting the sample into urban and rural households. Representing a novel methodological contribution to tourism studies, this study employs the Exact Affine Stone Index (EASI) demand system (Lewbel & Pendakur, 2009), a robust framework capable of capturing complex, nonlinear Engel curves and incorporating household heterogeneity. Our analysis reveals striking heterogeneity in consumption patterns.

This study makes several academic contributions. First, methodologically, it pioneers the use of the EASI model in this context, demonstrating its superior ability to capture the highly nonlinear consumption dynamics prevalent in rapidly developing economies. Second, theoretically, it provides clear empirical evidence for the role of asset liquidity in shaping consumption behavior. By analyzing urban and rural households separately, we show how institutional differences in property rights create divergent liquidity constraints that fundamentally alter the housing wealth effect. Third, we offer granular insights into the theory of financial constraints by quantifying the potent crowding-out effect of mortgage debt. We identify DTI thresholds for urban households, providing specific evidence of how debt overhang can negate the positive effects of income growth on discretionary spending. Collectively, these contributions refine our understanding of tourism demand and underscore the imperative of integrating institutional context and financial liabilities when analyzing consumption behavior.

The remainder of this paper is organized as follows. Section 2 presents a comprehensive literature review. Section 3 details the EASI methodology and data. Section 4 presents the empirical results and discussion. Section 5 concludes with key findings and policy implications. By addressing the above research questions, this study advances the understanding of tourism demand in China, offering insights that are both academically rigorous and policy relevant.

2. Literature review

2.1. Determinants of tourism demand: from income to wealth effects

A household's decision to spend on tourism is primarily driven by their disposable income and the relative prices of travel, which dictate their financial capacity for such discretionary spending (Crouch, 1994). Beyond these economic fundamentals, consumption patterns are significantly shaped by a combination of socio-demographic characteristics like age and life-cycle stage, psychological motivations such as the desire for escape or new experiences, and external factors including destination safety and accessibility (Song et al., 2023). Beyond recurring income, a household's overall wealth, which is often overlooked in many studies, can also influence its consumption decisions (Kim et al., 2012). Foundational consumption theories, such as the Life-Cycle Hypothesis (LCH, Modigliani & Brumberg, 1954) and the Permanent Income Hypothesis (PIH, Friedman, 1957), posit that households make spending decisions based not just on current income, but on their total expected lifetime resources, or wealth.

In this context, housing wealth emerges as a critical, yet complex, factor. Overlooking the substantial role of housing wealth can lead to an underspecified model of tourism demand and may explain the often-mixed findings in empirical research that relies predominantly on income measures (Zuo & Lai, 2020). Therefore, a comprehensive understanding of tourism demand necessitates a shift from a narrow focus on income flows to a broader analysis that incorporates the household's stock of wealth.

2.2. The contested role of housing wealth in household consumption

The relationship between housing wealth and household consumption is shaped by a central tension between two countervailing economic forces: *'housing wealth channel'* that stimulates discretionary consumption, and *'crowding-out effect'* that constrains it (Li & Zhang, 2021). The outcome of this dynamic is not universal but is moderated by the institutional context and behavioral factors. This review situates our study within this core debate, arguing that China's profound urban-rural institutional divide offers a unique opportunity to test these competing mechanisms.

The specific impact of housing wealth is itself complex and contested. Established theories like LCH (Modigliani & Brumberg, 1954) and PIH (Friedman, 1957) predict that households are willing to consume smoothly over their life cycle and an increase in housing wealth can be used as a buffer against risks by raising a household's perceived lifetime resources (Ando & Modigliani, 1963). This can occur through several mechanisms: increasing homeowners' net worth, thereby easing borrowing constraints (Bielskis, 2024); enhancing credit access through collateral effects (Muellbauer, 2008); and reducing the need for precautionary savings (Skinner, 1996). In contrast, the 'crowding-out effect' states escalating housing costs, including purchase prices, maintenance costs, rents and mortgage, can compel households heavily in debt with liquidity constrain to divert funds from discretionary spending like tourism towards housing obligations (Bostic et al., 2009; Campbell & Cocco, 2007; Chetty et al., 2017). The net impact on consumption thus depends on the relative dominance of these opposing forces.

2.3. The nexus of housing markets and tourism: a review of empirical evidence

Empirical studies from developed nations with liquid housing markets largely support the 'housing wealth channel'. Early empirical work by Alegre and Pou (2004) documented that wealthier households were more likely to take leisure trips and spend more per trip. Further supporting this channel, research by Bhadra (2012) on the U.S. market demonstrated that household wealth is a significant determinant of air travel demand, even after controlling for income, fares, and credit conditions. Similarly, Fereidouni et al. (2017) found that rising housing prices significantly boosted outbound tourism demand in Malaysia, confirming a direct housing–tourism wealth effect in a rapidly developing economy. Park et al. (2011) also observed that housing wealth exerted a robust influence on outbound tourism in South Korea, stronger than financial assets.

More recently, cross-country micro-level analysis in Europe (Bielskis, 2024) shows the magnitude of the housing wealth effect on tourism demand appears to be shaped by institutional factors and varies markedly with homeownership status. These results imply that the same level

of housing price appreciation can yield different tourism responses depending on how easily households can monetize housing gains through equity withdrawal or borrowing. This provides a strong conceptual basis for our study's decision to analyze urban and rural households separately in China, where property rights regimes, credit market accessibility, and housing liquidity differ sharply between urban and rural households.

2.4. Institutional context and heterogeneity: the urban-rural divide in China

In China, housing serves a **dual purpose**: a social necessity influenced by cultural norms (Wrenn et al., 2019) and a primary investment vehicle given limited alternatives and high appreciation expectations (Hamnett, 2021). This fuels demand but also contributes to acute constraining channels due to high price-to-income ratios and significant debt burdens, especially following the post-2016 mortgage expansion (Li, 2018). In addition, home equity withdrawal is often absent in China (Caporale et al., 2013), which may further limit the liquidity of housing wealth. Understanding the net effect of housing assets on consumption therefore requires moving beyond simply measuring perceived wealth and explicitly considering the liquidity of housing assets and the financial constraints imposed by associated debt obligations.

Institutional economics (North, 1990) highlights that property rights and market structures are paramount in shaping economic behavior. This lens is essential for understanding China, where a profound urban-rural divide, institutionalized by the *hukou* system and disparate land property rights, creates fundamentally different economic realities. In urban China, land is state-owned but tradable in the market, allowing households to realize capital gains and access mortgage finance. Here, both the wealth engine and the debt brake are active and in direct conflict. In rural China, land is collectively owned with severe restrictions on market transactions, limiting the ability of households to convert housing wealth into liquid resources. Because rural housing wealth is inaccessible, the mechanism that drives the wealth effect is severed, and the predictions of the LCH (Modigliani & Brumberg, 1954) and PIH (Friedman, 1957) do not hold.

Few studies have examined the housing wealth effect on tourism expenditure in China, and they have produced mixed or contradictory findings. For example, Zhang and Feng (2018) reported a positive housing wealth effect but found no significant mortgage crowding-out effect. This outcome likely stems from their methodological choice to pool urban and rural households, using hukou as a simple control variable rather than modeling it as the central explanatory mechanism shaping wealth accumulation and asset liquidity. Another study conducted by Zuo and Lai (2020) used the CFPS dataset to explore age and cohort differences, finding significant variation.

2.5. Econometric approaches to modeling tourism demand

The complex consumption dynamics and profound household heterogeneity discussed above pose significant challenges for empirical modeling. Traditional econometric approaches to tourism demand analysis fall into three methodological categories: time series models, single-equation regressions, and multi-equation systems. Early time series models like ARIMA, while useful for prediction, cannot explain the drivers of demand as they omit external factors (Assaf et al., 2012; Chu, 2009; Crouch, 1994). Single-equation models, such as Autoregressive Distributed Lag Model (ADLM) (Dritsakis & Athanasiadis, 2000), Error Correction Model (ECM) (Rosselló et al., 2004), and Time-Varying Parameter (TVP) model (Song & Wong, 2003), improved on this by including explanatory variables, but often lack a cohesive theoretical framework to model the interdependencies between different consumption choices.

To address this, theoretically grounded multi-equation system models, particularly the Almost Ideal Demand System (AIDS) (Deaton & Muellbauer, 1980), gained prominence in tourism demand studies due to its relative ease of use (Divisekera, 2016; Li et al., 2004; Wu et al., 2011). However, it should be noted that the AIDS model has key limitations: First, in the AIDS model, real expenditure is approximated using the Stone price index. This first-order approximation can introduce significant errors when price volatility is high or when inter-commodity price correlations are strong, potentially leading to biased estimates of demand elasticities. Second, the model implicitly assumes that the Engel curve is linear, rendering it unable to capture nonlinear patterns commonly observed in actual consumption data, such as S-shaped curves. Finally, the AIDS model typically assumes homogeneous consumer preferences. This assumption can lead to model bias when individual preferences exhibit significant heterogeneity.

The Exact Affine Stone Index (EASI) demand system, introduced by Lewbel and Pendakur (2009), extends the Almost Ideal Demand System (AIDS) by addressing key theoretical and empirical limitations: First, by constructing an exact Affine Stone Index, it maintains the linear characteristics of the demand equations without requiring price approximation, ensuring the budget constraint holds strictly at any price level. Second, it allows Engel curves to take any polynomial form, significantly enhancing its explanatory power for complex consumption behavior. Third, the EASI model directly accommodates preference heterogeneity by designing the error term to directly reflect unobserved preference heterogeneity. This design makes EASI more suitable for complex demand analysis, addressing the estimation challenges faced by the AIDS model in scenarios with significant individual differences. While the EASI model's versatility and robustness have been demonstrated in various contexts outside of tourism, such as energy demand (Reanos & Wölfing, 2018), food consumption (Bakhtavoryan et al., 2021; Vardges & Aleksan, 2019), and general household spending in China (Li et al., 2015), this study pioneers its application within the tourism literature. Given that tourism expenditure often exhibits precisely the kind of nonlinear total expenditure responses and pronounced consumer segmentation that challenge traditional models, the EASI framework's superior ability to handle price complexities, flexible Engel curves, and preference heterogeneity makes it an exceptionally suitable and more accurate tool for advancing the understanding of tourism demand dynamics.

In summary, while the literature establishes a central debate between housing's wealth and crowding-out effects, its applicability to China remains contested. While existing research acknowledges urban-rural differences, it has treated this divide superficially, rather than modeling the institutional cleavage in property rights and asset liquidity as the core mechanism explaining divergent outcomes. This conceptual shortcoming is compounded by a methodological limitation: the conventional demand systems employed are ill-equipped to capture the complex, nonlinear consumption behaviors and deep heterogeneity inherent in this unique economic landscape.

To synthesize the preceding discussion, this study proposes the theoretical framework depicted in Fig. 1. This framework illustrates how the core economic drivers of housing wealth and mortgage debt are theorized to influence tourism demand. Critically, it posits that their effects are not uniform but are fundamentally moderated by China's urban-rural institutional divide, a lens derived from institutional economics. This framework provides a clear conceptual basis for the separate empirical analyses conducted for urban and rural households in the subsequent sections.

3. Methodology and data

3.1. EASI model

The EASI framework, introduced by Lewbel and Pendakur (2009), is rooted in the concept of implicit Marshallian demands. It specifies a cost function from which Hicksian (compensated) budget share functions are derived. A key innovation is defining an "implicit utility" measure, y,

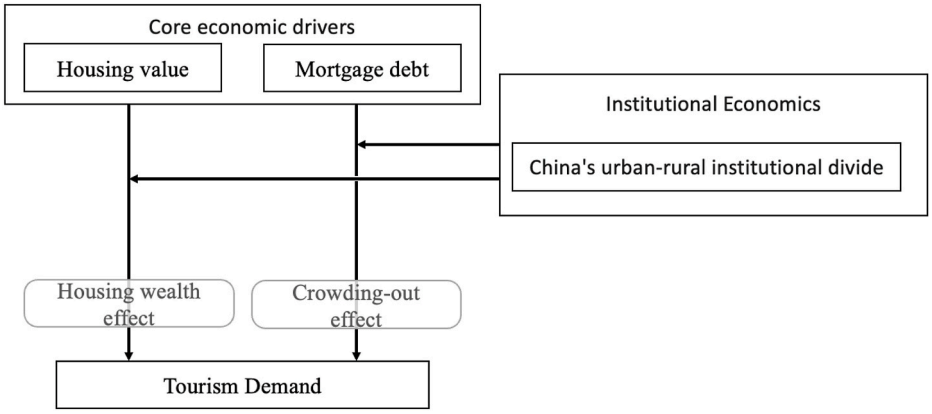

Fig. 1. Theoretical framework.

which is a simple function of observable data. This measure (y) is often interpreted as log real expenditure.

For empirical application, the EASI model specifies the budget share (w^j) allocated by a household to good j (out of J total goods) as a flexible function of implicit utility (y), household characteristics (z), and prices (p). The general equation for the budget share of good j is given by:

$$w^j = \sum_{r=1}^{R} b_r^j y^r + \sum_{l=1}^{L} g_l^j z_l + \sum_{l=2}^{L} h_l^j z_l y + \sum_{k=1}^{J} \sum_{l=1}^{L} a^{jkl} z_l \ln p^k + \sum_{k=1}^{J} b^{jk} \ln p^k y + \varepsilon^j \tag{1}$$

where w^j is the budget-share of good j; $\ln p^k$ is the log price of good k (where k can be any good in the system, including j); z_l is the lth characteristic, with z_1 defined as 1 to represent the intercept term; b_r^j is the parameter of the polynomial term y to the power of r, capturing potentially complex Engel curve shapes. In this study, we specify a third-order polynomial ($R = 3$) for the expenditure terms. This allows the Engel curve to be a flexible function of linear (y^1), quadratic (y^2), and cubic (y^3) components of log real expenditure. This specification is crucial for capturing the complex, nonlinear consumption patterns that simpler AIDS model cannot; g_l^j captures the direct effect of household characteristics l; a^{jkl}, b^{jk} and h_l^j are parameters for various interaction terms.

The term $\sum_{l=1}^{L} g_l^j z_l$ reveals the direct impact of household characteristics on budget shares; $\sum_{l=2}^{L} h_l^j z_l y$ captures the interaction effect between household characteristics and log real expenditure, reflecting how expenditure semi-elasticities vary across different household characteristics; $\sum_{k=1}^{J} \sum_{l=1}^{L} a^{jkl} z_l \ln p^k$ quantifies the heterogeneous adjustment mechanism of price semi-elasticities induced by household characteristics; $\sum_{k=1}^{J} b^{jk} \ln p^k y$ reflects cross-effects between price and real expenditure.

The implicit utility (y), is defined through an affine transformation of Stone Index-deflated nominal expenditures:

$$y = \frac{x - \boldsymbol{p}'\boldsymbol{w} - T(\boldsymbol{p},\boldsymbol{z}) + p'\left[\nabla_p T(\boldsymbol{p},\boldsymbol{z})\right]}{1 + S(\boldsymbol{p},\boldsymbol{z}) - \boldsymbol{p}'\left[\nabla_p S(\boldsymbol{p},\boldsymbol{z})\right]} \tag{2}$$

where x is log nominal expenditure; $\boldsymbol{w}$ is the vector of budget shares; $\boldsymbol{p}$ is the vector of log prices; $\boldsymbol{z}$ is the vector of household characteristics; $T(\mathbf{p},\mathbf{z})$ and $S(\mathbf{p},\mathbf{z})$ are functions of prices and characteristics derived from the cost function. This ensures that the price index is 'exact' and theoretically consistent with the preference structure. For the specific parametric form adopted in this study, equation (2) simplifies to:

$$y = \frac{x - \boldsymbol{p}'\boldsymbol{w} + \sum_{l=1}^{L} z_l \boldsymbol{p}' A_l \boldsymbol{p} \Big/ 2}{1 - \boldsymbol{p}'\boldsymbol{B}\boldsymbol{p}/2} \tag{3}$$

where $\boldsymbol{A_l}$ and $\boldsymbol{B}$ are symmetric matrices of parameters. y equals to x in the base period when log prices $\boldsymbol{p}$ are zero.

For the parameter estimation of the EASI model, it is crucial to address two core challenges: the nonlinear structure of the model and the issue of endogeneity. Equation (1) is a polynomial function of y, the parameters a^{jkl} and b^{jk} appear nonlinearly within the model. Furthermore, the endogeneity arises from the dependence between y and the budget shares w^j: y serves as an explanatory variable for w, while simultaneously being influenced by w through the model's structural equations.

To address endogeneity, this study employs the instrumental variable proposed by Lewbel and Pendakur (2009). The core instrument for log real expenditure is constructed from log nominal expenditure, deflated by a price index that uses sample average budget shares rather than individual household shares (since individual household shares cause the endogeneity). Finally, an iterative linear three stage least squares (3SLS) is used to estimate the EASI model. Further details on this iterative procedure can be found in Lewbel and Pendakur (2009).

The model's estimated parameters are then used to calculate Engel curves and semi-elasticities. Engel curves depict the relationship between household expenditure and budget shares allocated to specific goods, revealing critical insights into consumption behavior. The semi-elasticities describe how budget shares respond to changes in prices, expenditure, and household characteristics.

The Engel curves in the EASI model depend on the price vector and observable characteristics. At base prices, the vector of log prices $\boldsymbol{p} = [0, \ldots, 0]$, y equals log nominal expenditure x. Using these base prices, we derive the Marshallian Engel curves:

$$w^j = \sum_{r=1}^{R} b_r^j x^r + \sum_{l=1}^{T} g_l^j z_l + \sum_{l=2}^{T} h_l^j z_l x + \varepsilon^j \tag{4}$$

In addition, for a reference type of household with $z = [1, 0, \ldots, 0]$ and $\varepsilon^j = 0$. The Engel curve is expressed as $w^j = \sum_{r=1}^{R} b_r^j x^r + g_1^j$. The base-period Engel curves for reference households with varying unobserved heterogeneity are identical in shape but vertically shifted by the term ε^j.

Expenditure semi-elasticity measures how the budget share of a good changes with log real expenditure (y), reflecting the shape of the Engel curve. It is calculated as:

$$\frac{\partial \omega^j(\mathbf{p}, y, \mathbf{z}, \varepsilon^j)}{\partial y} = \sum_{r=1}^{R} b_r^j r y^{r-1} + \sum_{l=2}^{L} h_l^j z_l + \sum_{k=1}^{J} b^{jk} \ln p^k \tag{5}$$

The polynomial in y allows for a flexible, nonlinear relationship,

capturing how expenditure semi-elasticities evolve across different expenditure levels.

Price semi-elasticity Ψ_{jk} measures the change in the budget share of good j for a change in the log price of good k, holding implicit utility and other characteristics constant. It is given by:

$$\Psi_{jk} = \frac{\partial w^j(p, y, z, \varepsilon^j)}{\partial \ln p^k} = \sum_{l=1}^{L} a^{jkl} z_l + b^{jk} y \tag{6}$$

Price effects are more easily interpreted using normalized Slutsky matrix. The standard Slutsky substitution term measures the change in the compensated quantity demanded of good i for a one-unit change in the price of good j, holding utility constant. It captures the pure substitution effect. However, its units depend on the units of the goods and currency, making comparisons difficult. The normalized Slutsky matrix, as used by Pollak and Wales (1992), provides a unitless measure of these substitution effects. Its element represents the compensated price elasticity of demand for good i with respect to price j weighted by the budget share of good i. It quantifies the pure substitution effect in elasticity terms, scaled by the economic importance (budget share) of the good whose demand is changing. The normalized Slutsky matrix can be calculated from the matrix of compensated budget-share semi--elasticities Ψ, using the formula (Lewbel & Pendakur, 2009): $\boldsymbol{S} = \boldsymbol{\Psi} + \boldsymbol{w}\boldsymbol{w}' - \boldsymbol{W}$, where $\boldsymbol{w}$ is the weight vector and $\boldsymbol{W} = diag(\boldsymbol{w})$. Off-diagonal elements of $\boldsymbol{S}$ capture share-weighted cross-price substitution effects $\boldsymbol{S_{ij}} > \boldsymbol{0}$ indicates goods i and j are Hicksian substitutes, while $\boldsymbol{S_{ij}} < \boldsymbol{0}$ indicates they are Hicksian complements.

Semi-elasticity for the l-th household characteristic measures the direct impact of a change in household characteristic z_l on the budget share of a good. It is given by:

$$\frac{\partial w^j(p, y, z, \varepsilon^j)}{\partial z_l} = g_l^j + h_l^j y + \sum_{k=1}^{J} a^{jkl} \ln p^k \tag{7}$$

It allows the impact of a household characteristic to be heterogeneous, changing with both the household's expenditure level and the prices.

3.2. Data

3.2.1. Data source

Price data were obtained from the National Bureau of Statistics of China (2014–2020), varying regionally across 31 provinces and temporally across four survey years, resulting in 124 distinct price regimes. The price levels for Beijing in the reference period corresponding to the 2014 survey wave (i.e., the 2013 price data) were established as the base. All other price indices (across different provinces and years) were then expressed relative to this base.

Household-level data were sourced from the CFPS 2014, 2016, 2018, and 2020 survey wave. The CFPS dataset is designed to be nationally representative of China, employing a rigorous probability-proportional-to-size sampling strategy. This dataset provides information on expenditures across eight categories (tourism, transportation, housing, food, education, cloth, health, and cosmetics), as well as household mortgage obligations, self-reported housing values, and hukou registration status. Tourism expenditure was defined as self-reported annual spending on leisure travel, excluding business-related trips.

Merging these sources resulted in an unbalanced panel of 4585 household observations. Households were classified as urban or rural based on the CFPS hukou system, a method consistent with the literature that identifies hukou status as a determinant of institutional settings.

3.2.2. Handling tourism zero expenditure

The prevalence of zero expenditure, indicating households that did not travel, poses a challenge in data analysis. In the dataset selected for this study, the percentages of households reporting non-zero tourism expenditure were 18 %, 21 %, 26 %, and 30 % for the years 2014, 2016, 2018, and 2020 survey waves, respectively, resulting in left-censored data. This study focuses specifically on households that allocate expenditures to tourism, examining how they distribute their budgets across consumption categories. By design, we exclude households with zero tourism spending to enable a targeted analysis of spending decisions among active travel participants. This selection criterion means our final sample is designed to be representative of China's tourism-participating households, rather than the entire population. While this approach allows for clearer identification of the factors influencing tourism expenditure levels, it inherently limits our understanding of non-participating households. The exclusion assumes that tourism-spending households possess distinct characteristics, such as positive travel histories or favorable attitudes toward tourism, that differentiate them from non-spending households. Consequently, our findings apply specifically to the subset of households that choose to engage in tourism, rather than representing the full population of households.

3.2.3. Variable selection

3.2.3.1. Dependent variable. As shown in Table 1, dependent variables are budget shares measured by the ratio of monetary value of household consumption on each category (items including tourism, transportation, housing, food, education, cloth, health, and cosmetics) divided by total expenditure (sum of expenditure on all eight categories).

3.2.3.2. Independent variables. As shown in Table 2, independent variables include price vectors, household expenditure, and household characteristics. Household characteristics include housing value, DTI and multiple house ownership. Housing wealth is proxied by self-reported housing value from the CFPS. This practice is firmly established and aligns with the global standard for large-scale wealth surveys, including the U.S. Survey of Consumer Finances and the Eurosystem's Household Finance and Consumption Survey, which also rely on owner-reported values. Domestic studies by Chen et al. (2020) and He et al. (2020) also utilize this self-reported housing value from CFPS data to evaluate the impacts of housing value on consumer spending, confirming the methodology's precedent. Self-assessed housing values have been shown to exhibit relatively small bias (Goodman & Ittner, 1992; Kiel & Zabel, 1999). Multiple house ownership is included to capture behavioral mechanisms such as precautionary savings (Carroll, 1997; Kahneman & Tversky, 1979) and loss aversion (Chen, Li, & Wu, 2021). Time-specific effects and province fixed effects are included. Real expenditure is taken logarithm and centers around its mean and housing value is standardized with a mean of 0 and a standard deviation of 1 for estimation stability.

3.2.4. Sample profile

Table 3 reveals significant structural disparities between rural (1431 households) and urban (3154 households) samples. Rural households allocate a larger share of their budget to housing (15.4 % vs. 13.0 %) and transportation (8.0 % vs. 6.8 %), while urban households spend more on

Table 1
Budget share measurement.

Variable	Definition
Tourism budget share	Tourism expenditure/total expenditure
Transportation budget share	Transportation expenditure/total expenditure
Housing budget share	Housing expenditure/total expenditure
Food budget share	Food expenditure/total expenditure
Education budget share	Education expenditure/total expenditure
Cloth budget share	Cloth expenditure/total expenditure
Health budget share	Health expenditure/total expenditure
Cosmetics budget share	Cosmetics expenditure/total expenditure

Note: Housing expenditure encompasses all costs related to residential occupancy and maintenance, including rent, utilities, heating, property fees, maintenance and renovation.

Table 2
Definition of independent variables.

Variable	Definition
Tourism price	Touring and outing
Transportation price	Transportation (transportation facility, fuels and parts, fees for vehicles use and maintenance, incity traffic fee, intercity traffic fee)
Housing price	Building and decoration materials, renting, private housing, water, electricity and fuels
Food price	Grain, oil or fat, meat, poultry and processed products, eggs, aquatic products, vegetables (fresh vegetables), dried and fresh melons and fruits, fresh fruits, dining out
Education price	Durable consumer goods and services for recreational use, education, teaching materials and reference books, educational services
Cloth price	Clothing material, footgear and hats, clothing manufacturing service
Health care	Medical appliances and articles, traditional Chinese medicine, Western medicine, health care appliances and articles, health care services
Cosmetics price	Cosmetics
Expenditure	Sum of monetary values on consumption of eight categories
Housing value	Self-estimated total housing value
DTI	Annual mortgage/Annual income
Multiple House ownership	0 = have 0 or 1 house; 1 = have more than 1 house

tourism (5.1 % vs. 3.4 %) and education (10.9 % vs. 9.4 %). Food dominates expenditures in both groups, though slightly higher in urban areas (47.6 % vs. 44.4 %). Urban households report higher average log-expenditure (0.110 vs. −0.239), housing values (0.123 vs. −0.269 standardized), and the proportion of multiple house ownership (33.7 % vs. 24.5 %), alongside greater DTI (5.5 % vs. 2.7 %).

4. Results and discussion

4.1. Model fit assessment

In order to assess the model's goodness-of-fit, we present the decile-level analysis of tourism expenditure in Table 4, where the model's crucial strength lies. The predicted mean tourism budget shares track the observed shares with remarkable accuracy across the entire expenditure distribution for both samples, from the lowest to the highest decile. This excellent correspondence confirms the model's structural validity.

4.2. Estimated Engel curves and income effects

Table 5 summarizes the estimated coefficients of expenditure terms, revealing significant deviations from simple linear or quadratic Engel curve specifications. The terms y^1, y^2 and y^3 represent the linear, quadratic, and cubic components of this polynomial, respectively. Their statistical significance indicates the complexity of the Engel curve. A significant coefficient on a higher-order term (y^2 and y^3) provides strong evidence of a nonlinear relationship between total expenditure and budget share. Following the Permanent Income Hypothesis (PIH), households smooth consumption based on expected lifetime income. Accordingly, we use annual expenditure as a proxy for permanent income and employ expenditure semi-elasticities interchangeably with income semi-elasticities, consistent with Lewbel and Pendakur (2009). Goods are classified as luxuries or necessities according to their income (expenditure) elasticity of demand, inferred from the slope of the Engel curve. Hence, throughout the analysis, income is interpreted as equivalent to expenditure in capturing consumption behaviors.

The results for tourism among urban households reveal a complex relationship between total expenditure and budget share allocation. The coefficient for the linear term (y^1) is 0.014 and is highly significant at the 1 % level. This indicates a positive initial relationship. More importantly, the coefficients for the quadratic term (y^2) at −0.003 ($p < 0.05$)

Table 3
Data descriptive.

Sample	Variable	Mean	SD	Min	Max
All households (Obs=4585)					
Budget Shares					
	Tourism	0.045	0.057	0.00004	0.544
	Transportation	0.071	0.065	0.000	0.600
	Housing	0.138	0.146	0.000	0.976
	Food	0.465	0.164	0.003	0.920
	Education	0.104	0.102	0.000	0.711
	Cloth	0.070	0.055	0.000	0.786
	Health	0.085	0.101	0.000	0.971
	Cosmetics	0.018	0.02	0.000	0.181
Log-prices					
	Tourism	0.053	0.075	−0.102	0.310
	Transportation	−0.009	0.017	−0.053	0.056
	Housing	0.026	0.047	−0.041	0.161
	Food	0.083	0.064	−0.011	0.229
	Education	0.036	0.047	−0.037	0.149
	Cloth	0.066	0.04	−0.015	0.174
	Health	0.106	0.08	−0.005	0.297
	Cosmetics	0.068	0.028	−0.048	0.151
Log-expenditure					
	Expenditure	0.000	0.645	−2.741	2.982
Characteristics					
	Housing value (RMB)	0.000	1.000	−0.517	16.406
	DTI	0.046	0.125	0.000	1.000
	Multiple house ownership	0.308	0.461	0.000	1.000
Urban households (Obs=3154)					
Budget Shares					
	Tourism	0.051	0.061	0.0001	0.544
	Transportation	0.068	0.058	0.000	0.536
	Housing	0.130	0.140	0.000	0.878
	Food	0.475	0.158	0.009	0.886
	Education	0.109	0.100	0.000	0.582
	Cloth	0.068	0.053	0.000	0.786
	Health	0.078	0.095	0.000	0.971
	Cosmetics	0.018	0.020	0.000	0.176
Log-prices					
	Tourism	0.049	0.075	−0.102	0.310
	Transportation	−0.010	0.016	−0.053	0.056
	Housing	0.027	0.049	−0.041	0.161
	Food	0.083	0.064	−0.011	0.229
	Education	0.035	0.046	−0.037	0.149
	Cloth	0.066	0.040	−0.015	0.174
	Health	0.106	0.080	−0.005	0.297
	Cosmetics	0.066	0.027	−0.048	0.151
Log-expenditure					
	Expenditure	0.110	0.598	−2.741	2.222
Characteristics					
	Housing value (RMB)	0.123	1.123	−0.517	16.406
	DTI	0.055	0.134	0.000	1.000
	Multiple house ownership *	0.337	0.473	0.000	1.000
Rural households (Obs=1431)					
Budget Shares					
	Tourism	0.034	0.045	0.00004	0.476
	Transportation	0.080	0.078	0.000	0.600
	Housing	0.154	0.156	0.000	0.976
	Food	0.444	0.173	0.002	0.920
	Education	0.094	0.106	0.000	0.711
	Cloth	0.074	0.058	0.000	0.549
	Health	0.099	0.112	0.000	0.785
	Cosmetics	0.018	0.020	0.000	0.181
Log-prices					
	Tourism	0.063	0.072	−0.097	0.310
	Transportation	−0.008	0.018	−0.053	0.056
	Housing	0.023	0.042	−0.040	0.161
	Food	0.084	0.061	−0.010	0.229

(continued on next page)

Table 3 (*continued*)

Sample	Variable	Mean	SD	Min	Max
	Education	0.037	0.047	−0.037	0.149
	Cloth	0.065	0.039	−0.014	0.174
	Health	0.107	0.077	−0.005	0.297
	Cosmetics	0.071	0.028	−0.047	0.151
Log-expenditure					
	Expenditure	−0.239	0.678	−2.617	2.982
Characteristics					
	Housing value (RMB)	−0.269	0.562	−0.517	7.122
	DTI	0.027	0.100	0.000	1.000
	Multiple house ownership *	0.245	0.430	0.000	1.000

Note: *For this binary variable, the value represents the proportion of households having more than one house.

Table 4
Decile fit analysis for tourism budget share.

Expenditure Decile	Urban Households		Rural Households	
	Observed Mean	Predicted Mean	Observed Mean	Predicted Mean
1 (Lowest)	0.042	0.039	0.047	0.045
2	0.042	0.042	0.039	0.039
3	0.042	0.044	0.038	0.037
4	0.042	0.045	0.034	0.034
5	0.047	0.049	0.028	0.030
6	0.052	0.051	0.031	0.032
7	0.052	0.053	0.030	0.031
8	0.057	0.057	0.033	0.032
9	0.067	0.062	0.035	0.031
10 (Highest)	0.068	0.070	0.034	0.035
Overall Mean	0.051	0.051	0.035	0.035

and the cubic term (y^3) at −0.003 ($p < 0.01$) are also statistically significant. The significance of these higher-order terms suggests that a simple linear or quadratic model would be mis-specified. In contrast, for rural households, none of the expenditure terms for tourism are statistically significant, suggesting a much flatter and simpler relationship with income.

Table 5 indicates that, for urban households, cloth expenditure is the only category that approximates a linear relationship with budget shares. Conversely, tourism, transportation, housing, and education feature statistically significant cubic terms ($p < 0.05$), indicating complex nonlinear dependencies on income. Similarly, rural households demonstrate nonlinear Engel curves across most consumption categories (e.g., transportation, housing, food, and education), with the exception of tourism and cloth, which align closer to linear patterns. These findings empirically validate the superiority of the EASI model over traditional AIDS/QAIDS frameworks, as the latter cannot accommodate such varied and arbitrarily shaped Engel curves. The heterogeneity in curvature, particularly the prevalence of cubic terms, underscores the necessity of flexible demand systems to capture China's evolving consumption dynamics.

Figs. 2 and 3 show the Engel curves with a 95 % confidence interval at base prices and for a reference type of household for urban and rural subgroups respectively. The shape of the Engel curve, which plots budget share against log expenditure, is directly related to the expenditure semi-elasticity of demand. Since log real expenditure (y) was normalized to have a mean of zero, the reported income thresholds (e.g. y below −0.55 or y below −0.3) correspond to the points of normalized log real expenditure at which the first derivative of the polynomial Engel curve changes sign, marking a shift in how income affects the budget share of food expenditure. An upward-sloping segment of the curve indicates that, as total income rises, the proportion of spending allocated to the good increases, implying an expenditure elasticity greater than one (i.e., a luxury good). Conversely, a downward-sloping segment signifies that the budget share declines with rising income, indicating an elasticity below one and classifying the good as a necessity.

Tourism expenditure exhibits markedly different patterns across urban and rural households. Urban households exhibit a complex relationship between income and budget share allocation. Starting at the lowest income levels, there's a slight initial decrease in the proportion of the budget spent on tourism. As income rises to −1.5, this trend reverses and the budget share increases, indicating tourism behaves as a luxury good during this phase, consistent with the Life-Cycle Hypothesis. However, as incomes climb further towards the higher end of the spectrum (0.84), the budget share for tourism begins to decrease once more, suggesting it becomes less important relative to overall spending growth. In sharp contrast, the Engel curve for rural households is notably flat. The budget share dedicated to tourism remains relatively constant across the entire observed range of income levels, implying that spending on tourism tends to grow roughly in proportion to income or changes very little relative to the budget for these households. This highlights a significant difference in how tourism fits into the consumption patterns of urban versus rural residents as their economic status changes.

The EASI model also reveals nuanced patterns for other consumption categories. For Transportation, both rural and urban households exhibit an inverted U-shape overall, meaning transportation acts initially as a luxury before becoming a necessity at higher income levels. The budget share for rural households peaks at a higher income level (y=1.28) than for their urban counterparts ($y = 0.45$). This delayed peak likely reflects slower adoption of private vehicles and less-developed transport infrastructure in rural areas.

Housing presents an interesting contrast. Both rural and urban curves are broadly U-shaped, suggesting housing is a necessity whose share falls

Table 5
The coefficient of income term y.

Urban households							
	Tourism	Transportation	Housing	Food	Education	Cloth	Health
y^1	0.014***	0.012***	0.034***	−0.062***	0.006	−0.010**	0.001
y^2	−0.003**	−0.011***	0.079***	−0.061***	−0.008**	−0.001	0.007**
y^3	−0.003***	−0.004***	0.020***	−0.005	−0.006**	−0.001	0.000
Rural households							
	Tourism	Transportation	Housing	Food	Education	Cloth	Health
y^1	−0.000	0.031***	0.023	−0.022	−0.003	−0.019***	−0.004
y^2	0.002	−0.004	0.067***	−0.038***	−0.023***	−0.001	−0.002
y^3	0.000	−0.004**	0.004**	−0.003	0.002	0.001	0.000

Note.
* indicates significance at the 10 % level.
** indicates significance at the 5 % level.
*** indicates significance at the 1 % level.

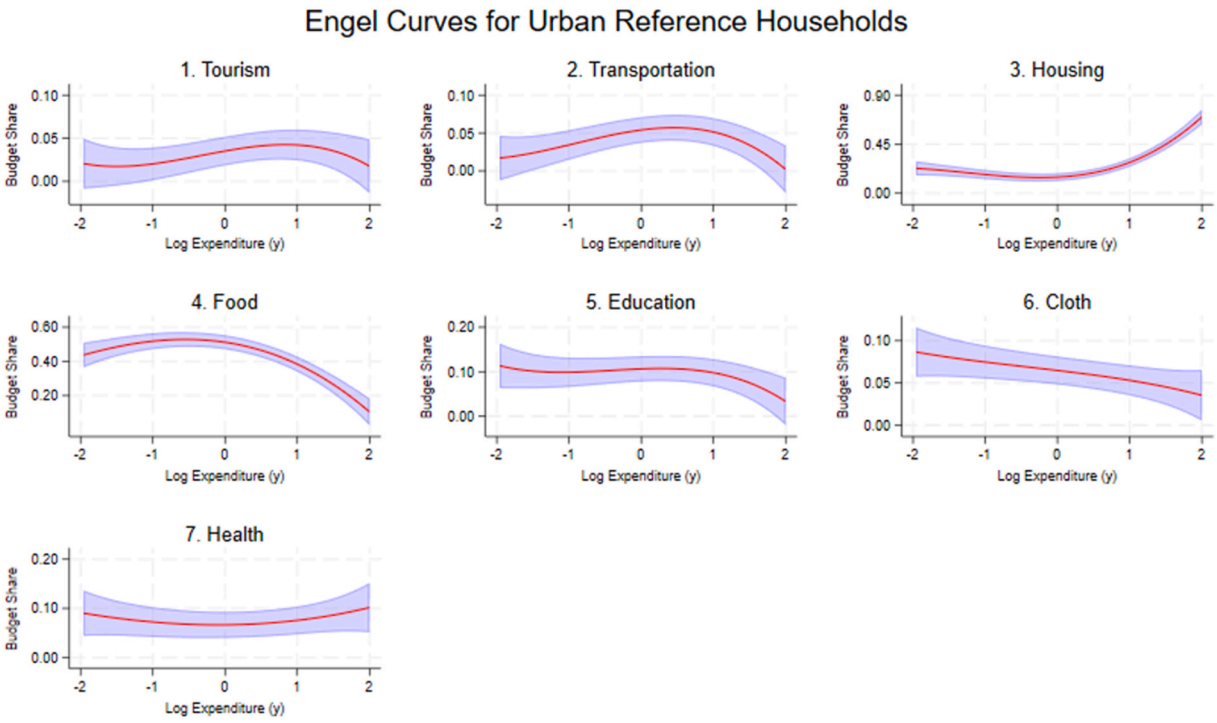

Fig. 2. Estimated Engel curves for a reference type of urban household.

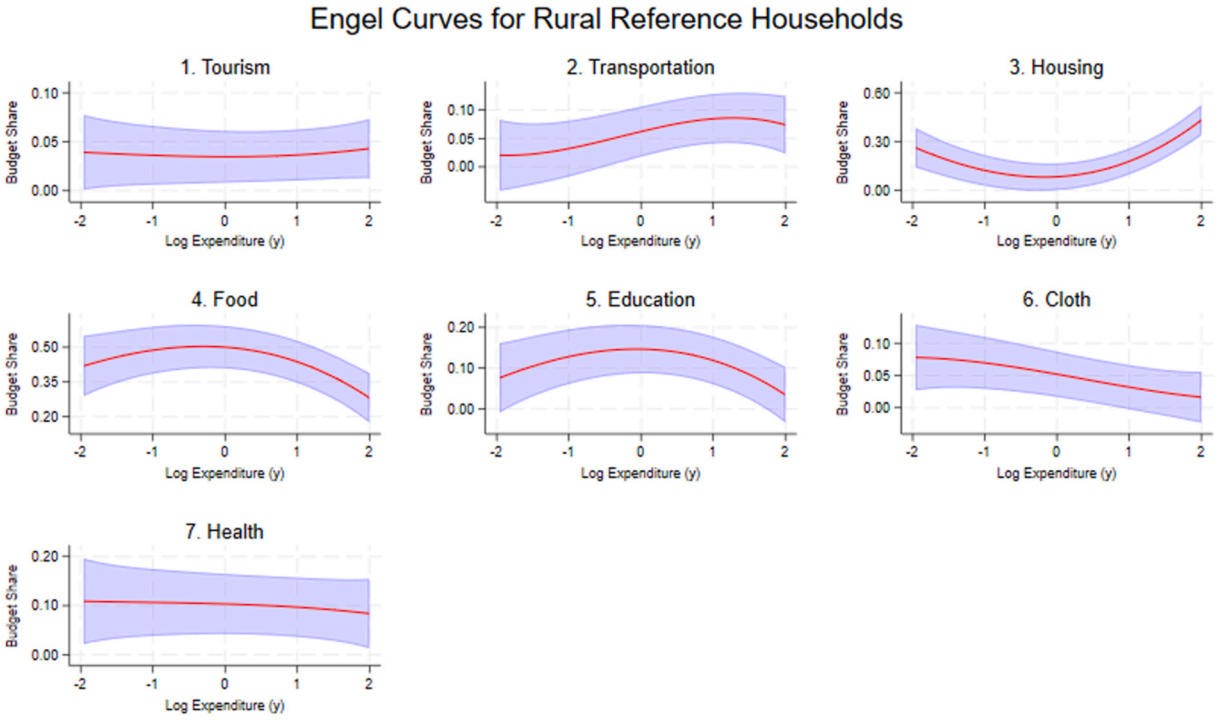

Fig. 3. Estimated Engel curves for a reference type of rural household.

initially but then becomes a luxury whose share rises as households prioritize better housing at higher incomes, which is consistent with the Life-Cycle Hypothesis. Yet, the dynamics differ greatly. Rural housing starts as a larger budget share, while urban housing's share begins lower but then increases dramatically and steeply for higher-income households, likely reflecting the high cost and desirability of better urban accommodation. This indicates urban housing becomes a much stronger luxury good than rural housing as incomes climb.

Analyzing the spending on Food, we observe a pattern largely consistent with Engel's Law (Engel, 1857) in both urban and rural subgroups: it's fundamentally a necessity as they show a downward slope overall. However, at the very lowest income levels (specifically, those with a log real expenditure y below −0.55 in the urban sample and y below −0.3 in the rural sample), both curves show a slight initial increase in budget share before the dominant downward trend takes hold. This suggests that for the very poorest households, an initial income rise

might lead to spending proportionally more on acquiring sufficient food. However, a key difference emerges quickly: urban households reach this peak food budget share much earlier, at a lower level of log expenditure, than their rural counterparts. Following this peak, both curves demonstrate the expected downward trend characteristic of a necessity. Yet, the rate of decline varies significantly. Urban households experience a much steeper and more rapid decrease in their food budget share as income grows. In contrast, rural households, having peaked later, also see their food budget share decline much more slowly and gradually. This means that food remains a dominant component of the budget for a wider range of incomes and diminishes in relative importance less quickly for rural households compared to urban households, who more readily allocate increasing proportions of higher incomes away from food towards other goods and services.

Education spending reveals notably different patterns between the two groups. In rural areas, the budget share follows a relatively straightforward inverted U-shape, suggesting education spending increases faster than income initially (acting like a luxury) before its relative share falls when log real expenditure y reaches 0 (becoming a necessity). The pattern for urban households is more complex. Starting from the lowest incomes, the budget share initially decreases noticeably (up until y equals −1.09), indicating necessity behavior. This is followed by a distinct flattening of the curve through the middle-income range, where the proportion of the budget allocated to education stabilizes and changes very little. Finally, as log real expenditure y rises to 0.28, the budget share begins to decrease again, resuming its behavior as a necessity whose relative importance shrinks in the overall budget. This multi-stage pattern (decrease - > flat - > decrease) for urban households contrasts sharply with the simpler inverted U-shape observed in the rural context.

Cloth behaves similarly in both environments, showing a consistent, gentle downward slope. This classifies cloth as a necessity for both rural and urban households, with its relative importance in the budget declining modestly as income increases.

Finally, Health expenditure presents another key difference. For rural households, health commands a consistently high and relatively flat budget share. However, towards the upper end of the income distribution, there is a discernible, though gentle, decrease in the budget share. This indicates that for the relatively wealthier rural households within this sample, health spending, while likely still increasing in absolute terms, grows less than proportionally to their overall income. In this higher income range, health starts to behave more like a necessity. Urban households, conversely, show a U-shaped curve: health is a necessity at lower incomes, but becomes a luxury after y reaches −0.09, suggesting wealthier urban residents spend proportionally more, perhaps on better quality or preventative care.

4.3. Price effects and substitution patterns

Having analyzed the relationship between tourism expenditure and total expenditure, we now turn to price effects analysis. This is essential for understanding how tourism demand responds to changes in its own price and the prices of other goods, allowing us to identify key substitutes and complements. As detailed in Section 3.1, the normalized Slutsky matrix captures these patterns through its price semi-elasticities. Table 6 shows the normalized Slutsky matrix for the reference type of Beijing household at mean expenditure.

In terms of own-price effects, urban households exhibit significant substitution away from several goods when their own relative prices increase. Notably, tourism (−0.134) shows a strong, highly significant negative effect, indicating considerable compensated price sensitivity. Significant own-price substitution is also observed for transportation (−0.048), education (−0.055), health (−0.094), and cloth (−0.019). The pattern differs significantly for rural households. The most prominent finding is the extremely strong and significant own-price substitution effect for cloth (−0.389). Health also shows a significant effect (−0.256). The own-price effect for tourism is not statistically significant, contrasting sharply with the urban finding.

In terms of cross-price effects, since there are many parameters and the focus of the study is on tourism demand, we focus on the results related to tourism. Regarding the urban subgroup, the cross-price effect of housing on tourism is small but highly significant and positive (0.002), indicating that tourism acts as a weak Hicksian substitute for housing services. When housing-related costs (rent, utilities, etc.) increase relative to other prices, urban consumers significantly substitute towards tourism, holding utility constant. This points to a psychological trade-off between material consumption (spending to acquire tangible goods, like housing) and experiential consumption (spending to acquire

Table 6
The normalized Slutsky matrix, evaluated for the reference type of household at mean expenditure.

Urban households							
	Compensated quantity derivatives						
	Tourism	Trans	Housing	Food	Education	Cloth	Health
Tourism	−0.134[c]						
Trans	−0.035	−0.048[a]					
Housing	0.002[c]	0.002	−0.089				
Food	0.020	0.021	−0.045	−0.085			
Education	−0.029[c]	−0.031[c]	−0.007	−0.017[a]	−0.055[c]		
Cloth	−0.030[c]	−0.031[c]	−0.007	−0.016[a]	−0.010	−0.019[b]	
Health	−0.031[c]	−0.032[c]	−0.011	−0.018[a]	−0.011	−0.011	−0.094[c]
Rural households							
	Compensated quantity derivatives						
	Tourism	Trans	Housing	Food	Education	Cloth	Health
Tourism	−0.087						
Trans	−0.068	0.015					
Housing	−0.066	−0.101	0.262				
Food	−0.017	−0.109	−0.332[a]	−0.074			
Education	−0.007	−0.012	−0.037	−0.301[a]	−0.144		
Cloth	−0.004	−0.004	−0.007	−0.026	−0.008	−0.389[c]	
Health	−0.013	−0.004	0.007	−0.052	−0.015	−0.005	−0.256[a]

Note.
[a] Indicates significance at the 10 % level.
[b] Indicates significance at the 5 % level.
[c] Indicates significance at the 1 % level.

a life experience, like tourism). Research in consumer psychology (Chen, Li, & Wu, 2021) demonstrates that financial stress caused by high housing-related costs can trigger a powerful self-escape motivation, which in turn increases an individual's preference for experiences over material goods. This means that tourism is a potential coping mechanism for the pressures of modern urban life, a finding strongly supported by survey data from China showing that many office workers would choose to travel when experiencing stress (Zhao et al., 2023). In addition, the cross-price effect of education (−0.029), cloth (−0.030) and health (−0.031) are all negative and highly significant, indicating that tourism is a Hicksian complement to education, cloth, and health. This suggests that households allocating higher budget shares to education, cloth, and health also tend to devote more resources to tourism. Tourism marketers could therefore position travel as an extension of consumers' investment in personal growth (education), personal expression (cloth), and personal wellness (health). At a policy level, integrating tourism into educational curricula (e.g., edutourism) or healthcare initiatives (e.g., wellness tourism) can amplify positive welfare and economic effects.

For the rural reference household, none of the cross-price effects involving tourism are statistically significant. This implies an absence of evidence for tourism being either a substitute or complement to housing services, education, clothing, or health in a compensated sense for this group. Together with tourism's insignificant own-price effect, this lack of tourism price response is likely caused by more fundamental structural constraints, such as a lack of access to finance, less-developed booking infrastructure, or a scarcity of tailored tourism products, and intrapersonal constraints, such as a less-developed "culture of travel" or different priorities for discretionary spending. This implies that for the rural market, demand is not waiting to be unlocked by marginal price changes but requires a more foundational market-creation strategy focused on building motivation and removing non-financial barriers to access.

The above findings underscore the deep heterogeneity in consumption patterns across urban and rural China and align with studies emphasizing urban-rural disparities in China (Hamnett, 2021). The results challenge approaches that might assume uniform price semi-elasticities across populations and highlight the importance of considering institutional and market context (like housing market liquidity or access to services) when analyzing consumption behavior, particularly for discretionary goods like tourism.

4.4. Housing wealth, debt and tourism demand

This section empirically tests the paper's central thesis: that the impact of housing wealth on tourism expenditure is fundamentally shaped by institutional factors and financial constraints. The analysis of housing value, DTI, and multiple house ownership reveals divergent patterns between urban and rural households. Results are shown in Table 7 for a Beijing household in 2014 survey wave.

4.4.1. The housing wealth effect

For urban households, the findings clearly validate classic consumption theories in a liquid, monetized housing market. Housing value has a statistically significant and positive direct effect on the tourism budget share (0.012), echoing the findings in Zuo and Lai (2020). A one standard deviation increase in self-estimated housing value corresponds to a 1.2 percentage point increase in the budget share allocated to tourism, holding other factors constant. This finding aligns with the classic "wealth effect" literature (Ando & Modigliani, 1963; Bostic et al., 2009; Campbell & Cocco, 2007). This effect is made possible by an institutional context of tradable property that allows for capital gains realization and active market participation. In addition, the interaction term between housing value and real expenditure is statistically insignificant (−0.000). This suggests that for urban households, this positive wealth effect on tourism's budget share is relatively consistent across different expenditure levels.

Table 7
Effects of household characteristics and interaction terms with real expenditure on tourism budget share, evaluated for a Beijing household in 2014 survey wave.

	Dependent variable is tourism budget share	
	Urban households	Rural households
Housing value	0.012[c]	0.010
Housing value × Real expenditure	−0.000	0.013[b]
DTI	−0.013	0.028
DTI × Real expenditure	−0.022[a]	−0.027[a]
Multiple house ownership	0.002	0.006
Multiple house ownership × Real expenditure	0.001	−0.006

Note.
[a] Indicates significance at the 10 % level.
[b] Indicates significance at the 5 % level.
[c] Indicates significance at the 1 % level.

In contrast, the direct effect of housing value for the rural subgroup is positive but not statistically significant. However, a significant positive interaction exists between housing value and real expenditure (0.013, $p < 0.05$). The fact that the wealth effect is confined to higher expenditure levels provides direct evidence of binding liquidity constraints. These constraints stem from China's rural land policy, which mandates collective ownership and non-marketability, thereby "locking in" property wealth and preventing its collateralization or monetization. Higher income might be necessary for rural households to overcome transaction costs, access credit based on housing collateral, or simply feel confident enough to translate latent housing wealth into actual discretionary spending like tourism. This contrasts sharply with the more direct wealth effect observed in the urban sample and highlights how institutional differences in property rights and market liquidity shape consumption responses.

Table 7 shows no significant direct effect of owning multiple houses on the tourism budget share for either urban or rural reference households, and no significant interaction between multiple houses ownership and real expenditure for either group. The statistically insignificant effect of multiple house ownership on tourism spending presents an empirical puzzle, as the precautionary savings motive (Carroll, 1997) predicts a negative relationship. Owning multiple properties acts as a proxy for heightened financial risk, increasing the volatility of both household expenses (e.g., unexpected repairs) and income streams (e.g., rental vacancy). This greater background risk should compel households to build a larger liquid buffer, thereby suppressing discretionary spending. However, the observed null finding suggests a theoretical equilibrium where this precautionary impulse is neutralized by equally strong countervailing forces. These include greater financial sophistication (Campbell, 2006), where households' superior literacy and cash-flow management mitigate perceived risk, and the drive for conspicuous consumption (Veblen, 2017), where both property and tourism act as complementary signals of social status, creating a powerful spending incentive. Thus, the insignificant coefficient suggests that the tendency for some multi-property households to curtail travel due to financial risk is effectively offset by the tendency for others to travel more, driven by greater financial confidence and the pursuit of social status.

4.4.2. The heterogeneous impact of mortgage debt on tourism expenditure

The direct impact of DTI on the tourism budget share is not statistically significant for either the urban (−0.013) or rural (0.028) subgroups at the mean expenditure level. However, the interaction terms between DTI and real expenditure are significant and negative for both urban (−0.022, $p < 0.10$) and rural households (−0.027, $p < 0.10$).

This reveals a critical dynamic: the burden of mortgage debt exerts a significant crowding-out effect on tourism spending, but primarily for

households with higher expenditure levels. While DTI may not constrain tourism for households at the mean expenditure, as income rises (and potentially the capacity to take on larger mortgages increases), a higher DTI significantly dampens the share allocated to tourism. This aligns strongly with studies documenting that increased mortgage burdens reduce discretionary spending (Chetty et al., 2017). This finding of a significant, conditional crowding-out effect stands in contrast to previous pooled-sample research on China which reported no such significant impact (e.g., Zhang & Feng, 2018). Our results suggest that the failure to find a crowding-out effect in earlier studies may be a direct consequence of aggregation bias. By combining urban households (where the effect is potent at higher income levels) with rural households in a single model, the averaging effect likely masks this critical dynamic. Our sub-sample modeling, therefore, provides a more granular and context-specific understanding, revealing that the debt crowding-out mechanism is indeed powerful, but its detection requires an analytical approach that respects China's deep institutional heterogeneity.

The interaction between income and debt reveals a critical threshold beyond which mortgage burdens negate the positive effect of rising income on tourism spending. This threshold is not a single value but rather a function of the household's real expenditure level (y). The total expenditure semi-elasticity of the tourism budget share can be expressed as the sum of the base income effect and the moderating effect of debt: $(b_1 + 2b_2y + 3b_3y^2) + h_{DTI}{*}DTI$. The DTI threshold is the point where this semi-elasticity equals zero. Using the coefficients for urban households from Tables 5 and 7, we can calculate the threshold as: $DTI_{threshold} = -\frac{0.014-0.006y-0.009y^2}{-0.022} = \frac{0.014-0.006y-0.009y^2}{0.022}$. This formula reveals a crucial dynamic: For a household at the mean real expenditure level ($y = 0$), the threshold is calculated as $0.014/0.022 = 63.6$ %. For a lower-expenditure household (e.g., one standard deviation below the mean, $y \approx -0.6$), where the marginal propensity to spend on tourism is higher, the DTI threshold rises to 65.3 %. Conversely, for a higher-expenditure household (e.g., one standard deviation above the mean, $y \approx 0.6$), where the positive income effect on tourism's budget share is already diminishing, the DTI threshold falls significantly to 32.5 %.

This finding's relevance is strongly supported by real-world macroeconomic trends. As illustrated in Fig. 4, the average DTI for Chinese households experienced a significant increase after 2014, surpassing even the lower 32.5 % threshold for higher-income households by 2018. For a large and growing segment of more affluent urban households, even a moderate mortgage burden is now substantial enough to fully crowd out the discretionary spending on tourism that would normally accompany rising incomes.

5. Conclusion

This study employed the Exact Affine Stone Index (EASI) demand system to dissect the complex relationship between housing wealth, mortgage debt and tourism demand across urban and rural China from 2013 to 2019. By moving beyond traditional models and explicitly accounting for how institutional frameworks shape economic reality, our research yields several critical insights into contemporary consumption dynamics.

First, our findings empirically validate the superiority of the EASI model for capturing the intricate, nonlinear Engel curves characteristic of a rapidly developing economy with significant heterogeneity. We demonstrate that consumption patterns, including tourism, deviate substantially from simple linear or quadratic relationships with income. Households clearly exhibit consumption upgrades aligned with Engel's Law (Engel, 1857), shifting towards discretionary spending as income rises. The dramatic contrast between the multi-phase urban tourism curve and the relatively flat rural one extends the work of Li et al. (2015).

Second, the study reveals how the impact of housing wealth is contingent on asset liquidity. For urban households with liquid property markets, the significant positive wealth effect from marketable assets aligns with findings from developed economies (Bostic et al., 2009), supporting the LCH (Modigliani & Brumberg, 1954) and PIH (Friedman, 1957). Conversely, the muted effect for rural households, whose assets are largely illiquid, provides strong empirical backing for Bielskis' (2024) argument that the wealth effect is fundamentally contingent on the institutional context governing asset liquidity.

Third, we provide strong evidence for the potent crowding-out effect of mortgage debt, a finding that differs from the findings of Zhang and Feng (2018). While the DTI's direct impact at mean expenditure is insignificant, its interaction with rising income is significantly negative for both urban and rural groups. Higher mortgage burdens increasingly suppress the allocation towards tourism, especially for households with greater spending capacity. Critically, for urban reference households, we identified critical DTI thresholds, beyond which mortgage payments effectively negate any positive impulse from rising income on tourism spending. This highlights how leverage can lock households out of discretionary consumption, irrespective of income growth. Our finding corroborates the crowding-out mechanism found by Campbell and Cocco (2007) and Chetty et al. (2017). Price sensitivity further underscores this divide, with urban tourism demand being elastic and substitutable with housing, while rural demand is largely inelastic.

Fourth, contrary to the theoretical expectation that increased risk aversion associated with multiple property ownership (controlling for

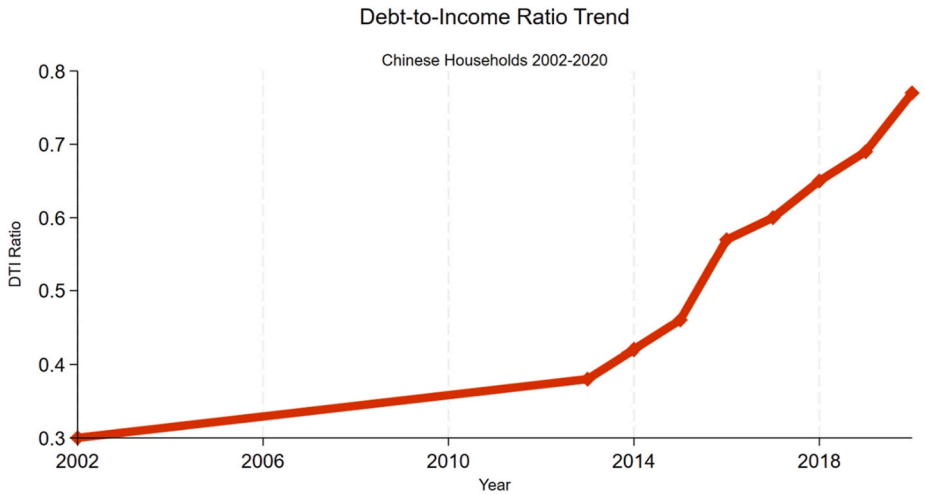

Fig. 4. DTI for Chinese households from 2002 to 2020 (Source: National Bureau of Statistics, 2002 to 2020).

total value) would suppress tourism (Carroll, 1997), we found no significant net effect. The increased cash flow uncertainty by owning multiple houses appears to be neutralized by two potential countervailing, non-monetary forces: the enhanced financial capacity and risk tolerance associated with greater financial sophistication, and the socio-cultural drive for conspicuous consumption, where tourism serves as a primary signal of social status. This finding reveals that among asset-rich households, consumption decisions are shaped by a complex interplay of risk perception, financial capability, and social positioning."

The practical implications of these findings extend beyond China and hold relevance for countries where housing constitutes a central component of household wealth. A primary implication is that tourism demand models and marketing strategies must evolve beyond simple income metrics to account for the full household balance sheet, specifically the tension between asset values and liability constraints. The study illustrates that the transmission of housing wealth into tourism expenditure is not automatic; it depends heavily on the existence of institutional mechanisms, such as liquid secondary markets or home-equity withdrawal products, that allow households to convert illiquid asset appreciation into consumption power. From a macroeconomic policy perspective, this study highlights the universal risk of debt overhang suppressing the service economy. When household leverage rises unchecked, it crowds out the discretionary consumption that drives economic transition. Therefore, policies aimed at managing mortgage burdens are not just tools for financial stability, but essential instruments for stimulating aggregate demand in the tourism and hospitality sectors.

Within China's specific institutional context, these general insights necessitate distinct strategies for urban and rural markets. For the urban consumer, who is often asset-rich from property appreciation yet cash-constrained by high mortgage payments, businesses require a psychologically nuanced approach. Travel should be framed not as a lower-cost substitute for housing-related expenditures but as an essential form of experiential investment that yields lasting well-being and psychological restoration beyond what further material consumption can offer. The observed complementarity suggests strategic opportunities for cross-sector collaboration, such as developing "edutourism" programs, cultural learning experiences, and wellness-oriented retreats that integrate physical and mental health dimensions. Conversely, the rural market's price inelasticity and flatter semi-expenditure elasticity curve suggest that tourism consumption is likely inhibited by more fundamental structural constraints (e.g., lack of information, access to finance, or tailored products) and intrapersonal constraints (e.g., a less-developed "culture of travel"). Consequently, a strategy focused on price competition is likely to be ineffective. Therefore, the imperative is market creation, which involves focusing on foundational marketing that builds travel motivation, simplifies booking processes, and reduces non-financial barriers to access, with promotions timed to coincide with periods of higher cash flow, such as post-harvest seasons.

From a policy perspective, the potent crowding-out effect of the DTI on tourism spending suggests that targeted interventions in the mortgage market could be an efficient form of economic stimulus. During economic downturns, policies aimed at reducing the burden of existing mortgages, for instance, through temporary interest rate subsidies or facilitating refinancing, could be more effective than broad-based stimulus checks. Such measures directly free up household cash flow at the margin for the very households most financially constrained, potentially unlocking latent demand for services like tourism and hospitality immediately.

While this study provides valuable insights, several limitations should be acknowledged. First, a key limitation is the exclusion of households reporting zero tourism expenditure. Households choosing not to travel may differ systematically from those who do (e.g., lower income, different preferences, binding liquidity constraints, lack of leisure time). Therefore, our findings regarding the determinants of tourism budget shares apply specifically to the subset of the population that participates in tourism and cannot be directly generalized to predict participation itself or the behavior of the entire population. Factors influencing the initial decision to travel might differ from those governing expenditure levels. Future research could include households reporting zero tourism expenditure by employing advanced methods, such as Bayesian estimation techniques, which can easily handle censored data. Second, the DTI, while standard, might not perfectly capture the complexity of household debt structures (e.g., type of debt, specific burdens of secondary properties). Future research should aim to unpack the "black box" of the DTI by utilizing more granular financial data. This would involve disaggregating household debt by type, to test whether different forms of leverage exert differential crowding-out effects on tourism spending. Third, the study relies on self-reported housing values, which can introduce potential biases. While the use of self-reported data is an established and often unavoidable practice in the wealth-consumption literature, future investigations could address this limitation by incorporating more objective and granular data, for example, by replacing self-reported values with externally sourced, market-based valuations from real estate databases. Fourth, while our study provides a theoretical foundation that identifies asset liquidity as the fundamental mechanism moderating the wealth effect, using hukou as a proxy does not fully capture the complexity of cross-regional asset mobility, such as rural households acquiring urban properties. Future research could build on this by using granular property data to measure the liquidity of a household's entire asset portfolio, regardless of their hukou. A fifth limitation is the treatment of tourism as a single analytical category. The CFPS data provides an aggregate measure of expenditure, bundling together distinct activities like high-cost international holidays and low-cost domestic trips. These different tiers of consumption likely have unique drivers and varying sensitivities to housing wealth and debt. Consequently, our findings reflect the aggregate net effect across this unobserved spectrum and do not fully capture the stratification of tourism consumption or the heterogeneity of its underlying drivers. Future research using more granular data is needed to disaggregate these effects and analyze how specific tourism market segments respond to household financial conditions.

CRediT authorship contribution statement

Yiying Li: Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Long Wen:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Richard T.R. Qiu:** Writing – review & editing, Investigation, Conceptualization. **Chang Liu:** Supervision, Investigation, Conceptualization.

Impact statement

Employing the sophisticated Exact Affine Stone Index (EASI) demand system on national household data, this paper systematically models the complex interplay between housing wealth, mortgage debt, and tourism demand, explicitly accounting for China's profound urban-rural institutional heterogeneity. This study not only reveals that distinct property rights and market liquidity significantly shape the housing wealth effect on tourism (positive for urban, conditional for rural households), but also quantifies the potent, income-dependent crowding-out effect of mortgage debt, with dynamic Debt-to-Income (DTI) thresholds, beyond which mortgage debt negates income growth's effect on tourism spending for urban consumers. It also maps the divergent, nonlinear demand patterns for urban (multi-phase, price-elastic) and rural (flat, inelastic) tourism. These findings provide actionable implications: for marketers, they reveal strategies for positioning travel as a substitute for housing costs and bundling it with complements like education and health; for policymakers, they establish the DTI ratio as a key indicator of aggregate demand and highlight mortgage policy as a potent tool for consumer stimulus.

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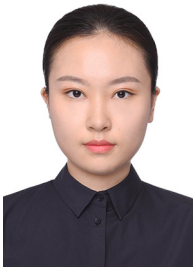

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