ARTICLE

Trust premium in the second-hand housing market: evidence from the negotiation rate

Fang Zhang[1,4], Hang Zhang[2] & Yun Zhang[3✉]

Trust is an important social capital and informal institution that influences transaction behaviors, especially in the second-hand housing market of China. This study analyzes the second-hand housing transactions of 17 cities and matches the birthplaces of these traders with CESS2000 to measure the degree of trust in each transaction. Then we use the combined dataset to examine the impact of the degree of trust on the bargaining power during the negotiation process. The empirical results indicate that there is a significant positive correlation between the degree of trust and negotiation rate, and buyers are more likely to capture trust premium. Moreover, "youth capital" emphasizes the role of trust in price bargaining during the second-hand housing transactions. Local advantage has a substitution effect on trust, which means it is an alternative explanation of trust affecting price bargaining during the second-hand housing transactions. Furthermore, the impact of trust varies by gender with male traders being more affected than female traders. All in all, this study provides practical implications of trust premium in housing transactions, and policy implications of establishing a social credit system. Governments can reduce transaction friction and transaction costs by establishing an appropriate formal institution, such as a personal credit database. As research on trust premium affecting micro-behaviors in the housing market is scarce, this study aims to fill this gap.

[1] Shanghai Collaborative Innovation Center of Yangtze River Delta Technology Innovation Industry Financial Service, Shanghai, China. [2] Shanghai University of Finance and Economics, Shanghai, China. [3] Shanghai Lixin University of Accounting and Finance, Shanghai, China. [4]Present address: Shanghai Lixin University of Accounting and Finance, Shanghai, China. ✉email: zhacloud@163.com

Introduction

In China, the housing market has experienced a remarkable transformation since 1998, which indicates that the market has evolved from a welfare housing distribution system to a commodity housing system (Zhang et al., 2018; Zhang and Zhang, 2019). Against this background, the influx of people in developed cities has resulted in an excessive rise in housing prices and a shortage of housing resources. However, in recent years, the People's Republic of China government has issued a series of real estate-related policies to stabilize the real estate market (Li et al., 2021). The most important guidelines, so called "houses are for accommodation, not for speculation", explicitly prohibit the use of real estate as a short-term means to stimulate the economy. Especially since 2020, due to the COVID-19 pandemic, the Chinese real estate market suffered and experienced a cliff-like decline. In China, all the land is either state-owned or collectively-owned (Zhang, 2017). The government limits and controls the land supply for residential housing construction in order to achieve balanced development, resulting in a shortage of construction land for new housing. Major housing transactions in big cities have gradually shifted from the newly-built housing market to the second-hand housing market due to population growth and land supply constraints. As of 2022, the cumulative trading amount of second-hand housing exceeded 40 trillion RMB[1], and in many first-tier cities, the trading amount of the second-hand housing has surpassed the amount of newly-built housing.

According to Wong et al. (2012), information asymmetry is a barrier that prevents buyers and sellers from engaging in mutually beneficial trades within a free market. This occurs when buyers and sellers possess different levels of knowledge regarding the subject of the transaction. In the case of the housing market, sellers who have owned or used their goods for a while have more information about their product's condition than buyers. Buyers, on the other hand, may not have the means to accurately assess a product's true quality (Li and Chau, 2023). Consequently, the housing market is plagued by a severe problem of information asymmetry, particularly in the second-hand housing market (Agarwal and He et al., 2019). There are extremely high information barriers in China's second-hand housing market due to the massive number of housing transactions and the backwardness of formal institutions, which causes false housing sources, fake housing information, transaction defaults and other problems (Zhou et al., 2015). These problems have plunged the second-hand housing market into a dilemma of "lemon market" by exacerbating the trust issue.[2] Li et al. (2022) use meta-classification as a framework to conduct four dimensions of factors affecting housing prices in China: economic dimension, social dimension, administrative dimension and environmental dimension. Their study reveals some research gap of Chinese housing market, for example, some unique factors which affected China's housing prices were mentioned in Chinese articles only but not often researched in English ones, such as government investment, macro-control, the unique second-child policy, and so on. However, there are rare studies focusing on the impact of micro-individual behaviors on housing prices.

Our paper makes three contributions to the literature. First, our contribution is related to bargaining power. The existing literature mainly focuses on the impact of social trust on macroeconomic performance, but the micro-level mechanisms of social trust are rarely discussed. There is still a lack of sufficient empirical evidence regarding the role of social trust in correcting the lemon market dilemma, especially in the asymmetric information market. Our study extends the impact of social trust on the economy from macro performance to micro individual behavior and provides empirical evidence of the significant role of social trust in the lemon market.

Second, we demonstrate that generating price premiums in real estate transactions requires trust between buyers and sellers. Generally, researchers only focus on how trust affects corporate or individual decision making, such as whether trust contributes to corporate off-site investments or personal business decisions. However, the micro market participants are more concerned with the economic payoff of trust, the so called "trust premium" (Pavlou and Dimoka, 2006). Broadly speaking, a premium is a price paid for above and beyond some basic or intrinsic value. Relatedly, it is the price paid for protection from a loss, hazard, or harm. While "trust premium" refers to that consumers are willing to pay a price premium for their trust regarding the counterparty (Cumming et al., 2020). More specifically, in our study, "trust premium" in the second-hand housing market consists two aspects: one is that buyers are willing to pay a premium for their trust to sellers; the other is that sellers are willing to give a discount for their trust to buyers. Our study employs the negotiation rate as the proxy of trust premium to quantitatively analyzes the trust premium on a micro-level transactions.

Third, we contribute to the literature on economic behavior by examining the role of social interactions in activities ranging from financial decisions (Duflo & Saez, 2002; Hong et al., 2004) to social problems (Coppens et al., 2018). Behavioral economics explains trust as a positive psychological expectation of fulfilling commitments that is strongly influenced by individual characteristics, such as age (Fett et al., 2014), gender (Eto et al., 2012), race (Agarwal and Choi et al., 2019; Stanley et al., 2011), and so on. The threshold and object of trust vary greatly among different groups of people (Sent, van Staveren (2019)). Our study reflects on trust from the perspective of individual identity and social network.

In summary, four research questions are proposed:

1. Whether and how does the trust degree between sellers and buyers affect their price bargaining during the second-hand housing transactions?

2. How does the "Youth Capital" moderate the effect of trust on the price bargaining power during the second-hand housing transactions?

3. Is there an alternative explanation of trust affecting price bargaining during the second-hand housing transactions?

4. Is there heterogenous effects of trust affecting price bargaining between different genders during the second-hand housing transactions?

The remainder of the paper is structured as follows: Section 2 briefly reviews literature and proposes hypotheses. Section 3 introduces the data and research method. Section 4 presents the empirical results and robustness tests. Section 5 focuses on heterogeneity analysis and further discussion. Section 6 concludes the paper and suggests a few policy recommendations.

Literature review and theoretical hypotheses

Since the reforms and opening-up in 1978, China has made remarkable progress toward economic development. However, the dramatic changes in the social structure have also revealed various problems, the most significant of which is the loss of social trust. According to Rousseau et al. (1998), trust is a fundamental concept of social capital that pertains to individuals' proactive expectation of the intentions and actions of others. Anthropologists assert that trust originates from family and kinship ties (de Groote and Bertschi-Michel, 2021) or from interpersonal relationships (Lei et al., 2021), while culturalists contend that trust results from long-term cultural accumulation (Van Lange, 2015). However, economists argue that trust, as a form of social capital, is often the product of individuals' rational

choices (Zhang and Ke, 2002). The loss of trust not only severely hinders the circulation of products and labor in the market but also poses the problem of "easy to lose, difficult to re-establish." The social trust crisis, developed during the transition period, will become long-term obstacles for economic development if they are not resolved effectively (Knack & Keefer, 1997; Zak & Knack, 2001).

Institutions are the rules of games of society in new institutional economics. While formal institutions refer to laws and regulations stated in black and white, informal institutions refer to rules that are not written in black and white like cultures affect human's behaviors (Song et al., 2022). Informal institutions play a more significant role in the economy as a result of the absence of formal institutions (Lützkendorf and Speer, 2005; Pope, 2008). The Chinese society places great emphasis on kinship, and other personal connections play an essential role in the modern economy. Trust is one of the most important factors affecting transactions in the Chinese economy. It is mainly reflected in aspects that cannot be covered by formal institutions, and its main function is to facilitate the operation of the economy by dissolving uncertainty. Existing studies have laid the foundation for understanding the role of trust in economic operations and revealed the importance of trust in removing information barriers and promoting market growth. However, few studies have examined the impact of trust premium on price bargaining during housing transactions.

Trust is a core concept of social capital and refers to individuals' active expectation of other people's intentions and actions (Rousseau et al., 1998). As an informal institution, it has a profound influence on various aspects of economic activity (Park et al., 2014; Xu et al., 2016). Historically, economic literature considered trust as a part of regional culture and measured its economic value as a form of "social capital" by comparing the economic performance of high trust regions with low trust regions. For instance, Knack and Keefer (1997) used indicators of trust and civic norms from the World Values Surveys for a sample of 29 economies to measure social trust and found that trust and civic norms are stronger in nations with higher and more equal incomes, as well as higher economic growth. Furthermore, Guiso et al. (2004) and Zak and Knack (2001) examine the intrinsic mechanism by which social trust affects economic growth. Their studies show that social trust can redress unreasonable risk expectations to promote corporate and personal investments. Since social trust significantly affects economics, other literature discusses the origin of trust culture and concludes two perspectives: the first is that traditional production modes are more beneficial to the shaping of trust culture. By comparing the coastal and the lake areas of Brazil, Gneezy et al. (2016) found that coastal areas have higher social trust due to the collective nature of fishing. The other is the heterogeneity of intra-regional populations, which causes a clash of values and impedes the expansion of trust. According to Alesina and La Ferrara (2002), the higher the intra-communal racial heterogeneity, the lower the communal trust degree.

The findings of the population structural heterogeneity influencing trust building implies common values are the foundation of interpersonal trust. Specifically, trust is not universally given but based on the common characteristics between objects. It is a private relationship between individuals rather than a common attribute within regions. Over time, the concept of "trust" has evolved from "social capital" to "social network"; thus, scholars began to study the impact of trust on people's interactive behavior from a bilateral perspective. Data on bilateral trust between European countries were used by Guiso et al. (2009) to conclude that lower levels of bilateral trust lead to lesser trade, portfolio investments and direct investments between the two countries.

With the same data, Bottazzi et al. (2016) examined the effect of trust on venture capital and found that the Eurobarometer measure of trust among nations positively predicts investment decisions by venture capital firms. The most popular bilateral trust survey in China is the "Chinese Entrepreneur Survey System 2000" (CESS, 2000). In this survey, the indicator assesses the degree of trust between province A and province B, which means there are two directional trust degrees between two provinces. These data are very useful in studying bilateral trust in housing transactions. However, most domestic scholars use this survey to investigate social capital issues (Cao et al., 2015; Liu et al., 2009). From the perspective of social networks, only Cao et al. (2019) address the issue of how the degree of trust in other regions affects parent companies' decision to deploy subsidiaries at different locations. Therefore, further research on trust in social networks is needed.

Theoretically, trust is used to solve market collapse problems caused by excessive risk expectations in an asymmetric information market, especially in the absence of a formal institution. Hence, individual bilateral trust can effectively reduce the uncertainty of transactions and facilitate the sound development of markets. It is important to emphasize the influence of trust in these kinds of market, such as the second-hand housing market. We selected the Chinese second-hand housing market to investigate the role of bilateral trust in transactions. Both sides lack effective information about each other and are unaware of how reliable and effective the information is. Moreover, the transaction process of second-hand housing is quiet lengthy. This is primarily due to the complex and changeable market conditions, which easily lead to economic losses caused by credit default. Considering the huge trading amount of housing transactions, these uncertainties generate additional risk expectations and a risk premium into bargain prices, which causes sellers (buyers) to offer a much higher (lower) price than their real expected price, called a "conservative offer." Conservative offers severely impede the bargaining process and reduce the success rate, which leads to inefficiency and the collapse of market (Cramton, 1991).

As the third party of housing transactions, the second-hand real estate agency makes many efforts to resolve the dilemma of conservative offers, such as field visits to the property, collecting trading deposits from traders, and so on. Due to the drastic fluctuations in the housing market, default earnings usually exceed default costs, so it is common for traders to default even after giving the deposit. A trust-based approach can enhance the reliability of trading information, mitigate risk expectation of traders, and alleviate the problem of conservative offer (Williamson, 1993). Additionally, trust can improve communication between people and build a sense of identity and intimacy, transforming the price bargaining process into a mutually beneficial transaction. Traditional Chinese culture creates deep personal networks into modern corporate governance and public governance (Dai et al., 2016; Fan & Li, 2014; Gao et al., 2019), thus allowing the coexistence of formal and informal institutions. Trust, as a typical product of personal relationships, can guide micro-level transactions in the absence of formal institutions.

Several studies show that there are two ways to establish a trusting relationship. First is the repeated game approach, which measures the degree of trust based on past transactions (Zhang & Ke, 2002). It is the repeatability that builds trust. In second-hand housing transactions, each transaction is usually a one-time deal, which cannot be repeated. Therefore, the degree of trust can be measured by the regional impression. China is a vast country, and its culture differs greatly between regions. The cultural differences lead to differences in value orientation and behavior standards (Cao et al., 2019). Individuals with similar cultural backgrounds have more certainty about the other side's activities and more

reliable regional impressions. Whereas it is difficult for people from different cultural backgrounds to build reliable impressions[3] (Dai et al., 2016; Zhai, 2014). Therefore, during the second-hand housing transactions, a typical single-time not repeatable scenario, it is reasonable for traders to evaluate each other's degree of trust based on their regional impression, which is in line with theoretical inferences and China's reality.

Rubinstein (1985) extended Rubinstein (1982) by arguing that the discount factor affecting bargaining outcomes depends not only on the negotiators themselves, but also on their initial perceptions of their counterparts. If negotiators anticipate that their counterparts will not easily concede, they will increase their expectations of the negotiation's duration, thereby compressing their own discount factors. To make the bargaining model more realistic, Rubinstein (1985) broadened the discount factor's components from an individual dimension to an individual network dimension. However, he did not adequately explain the composition of individual networks in negotiations or what factors influence the bargaining counterpart's prediction. In response to Rubinstein (1985), Agarwal et al. (2019) expanded the role of individual characteristics in bargaining to the network dimension. They argued that the degree of assertiveness in the bargaining process is not only based on "who I am" but also on "what I am dealing with." The authors analyzed the bargaining process between different races in the Singapore housing market and found that greater racial disparities result in lower bargaining power due to increased risk expectations caused by interracial trust barriers. Their findings indicated that buyers' and sellers' perceptions of each other can significantly influence bargaining power and outcomes.

If information barriers are not taken into account, there is no problem with conservative offers (Lehn and Poulsen, 1991 & 1998). We assume that there is only one seller and one buyer in the second-hand housing market. After negotiating, they agree to a price that is acceptable to both the parties, or close the deal. If the acceptable floor for a seller is a, the seller will keep the house when the price is lower than a. If the acceptable roof for a buyer is b, the buyer will give up when the price is higher than b. Clearly, when $a > b$, the deal will close; only when $a \leq b$, the deal will succeed. The transaction price is $p \in [a, b]$, and the market size is dependent on the interval width of $p \in [a, b]$.

We apply a discount factor to get the trading price p (Rubinstein, 1982). The discount factor represents the rate at which future assets are discounted to the present value, which implies two connotations. The first is the potential loss of asset by delaying transactions, and the other is the tolerance capacity of traders for these losses. During a second-hand housing transaction, making the deal at the present time is ideal for both buyers and sellers. A certain amount of loss will occur if the transaction is delayed by price game. The discount factor measures traders' mental pressure from such losses. It is smaller if there is a greater asset loss and a reduced risk tolerance, which makes traders more eager to make the deal and make concessions during price negotiations. We assume the discount factors of sellers and buyers to be δ_1 and δ_2 respectively. According to Rubinstein (1982), the final trading price is[4]:

$$p = \frac{1 - \delta_2}{1 - \delta_1 \delta_2}(b - a) + a \qquad (1)$$

The trading price is determined by $\frac{1 - \delta_2}{1 - \delta_1 \delta_2}$, where we set up $\frac{1 - \delta_2}{1 - \delta_1 \delta_2} = \theta$. When $\delta_1 > \delta_2$ and θ is bigger, sellers will take the psychological advantage during price negotiation, closing the deal by charging a higher price and vice versa.

The existence of information barriers reduces the reliability of information and transaction. Thus, the risk premium will be reflected in the trading price when considering information barriers. If the proportion of risk premium is φ, then sellers raise the price floor to $(1 + \varphi)a$, where φa is the capitalized value of transaction's uncertainty. Similarly, buyers reduce the price roof to $(1 - \varphi)b$, and the transaction interval is narrowed down from $[a, b]$ to $[(1 + \varphi)a, (1 - \varphi)b]$. The "conservative offer" caused by information barriers reduces the probability of successful transactions and reduces the total transaction size (Lehn and Poulsen, 1991 & 1998). We apply the new price interval into Eq. (1) to get the final trading price with information barriers:

$$p = \theta(b - a) + a + [a - \theta(a + b)]\varphi \qquad (2)$$

To determine the effect of information barriers on the trading price, we use p to take the derivative of φ:

$$\frac{\partial p}{\partial \varphi} = a - \theta(a + b) \qquad (3)$$

The sign of the coefficient of information barriers can be determined by the relationship between $a - \theta(a + b)$ and 0. When $\delta_1 < \delta_2$, $\theta < \frac{a}{a+b}$, and $\frac{\partial p}{\partial \varphi} > 0$, information barriers have a positive relationship with the trading price. Thus, the uncertainty magnifies the risk expectation and affects buyers (smaller δ_1) more, so the price threshold raised by sellers is higher than the price threshold decreased by buyers. The sellers prefer to reject the deal if it is not more beneficial to them. Whereas, when $\delta_1 > \delta_2$ and $\theta > \frac{a}{a+b}$, the correlation between information barriers and trading price is negative.

As the usual negotiation model assumes $\delta_1 = \delta_2$, the second-hand housing transaction is a special negotiation case and the discount factors of both the parties are significantly different (Kurlat and Stroebel, 2015). First, the housing prices in China have increased dramatically during the past three decades, and the value of most second-hand houses held by sellers has doubled over the last decade. In contrast, houses are extremely expensive for buyers. Thus, the discount on second-hand houses during a transaction is of much more importance to buyers than to sellers. Due to this, the marginal utility of buyers is higher than sellers, which means that sellers' discount factor is smaller than buyers', $\delta_1 < \delta_2$. Second, information asymmetry is a major source of information barriers (Rhodes-Kropf et al., 2005). Despite the fact that sellers have more knowledge of the houses they own, they often delegate all agency rights to real estate agents in China's second-hand housing market. Since sellers only ask for the final price, they do not investigate the market situation independently. As their house is the most valuable asset of a Chinese family, buyers often investigate the market thoroughly and compare as many houses as possible within their budget. Therefore, buyers have a greater understanding of the whole picture of the second-hand housing market than sellers, which means they have a larger discount factor than sellers. Third, the size of assets held by both the parties is quite different, and buyers often use financial leverage to purchase a house. To this extent, the real asset held by the buyer is merely the down-payment, while the real asset held by the seller is the total amount of the transaction. During this transaction, the asset held by the seller is greater than that held by the buyer, with the same risk expectation, and the size of risk asset held by the seller is also greater than that held by the buyer. Fourth, traders have different asset classes. Since the mobility and liquidity of real estate held by the seller is significantly lower than cash held by the buyer, failure to close the deal results in a higher opportunity cost for the seller.

Assuming that seller's discount factor is smaller than buyer's ($\delta_1 < \delta_2$) and θ is small enough to make $\frac{\partial p}{\partial \varphi} > 0$, so the trading price rises as information barriers increase. Moreover, the relative difference between δ_1 and δ_2 is aggravated by the increase in age
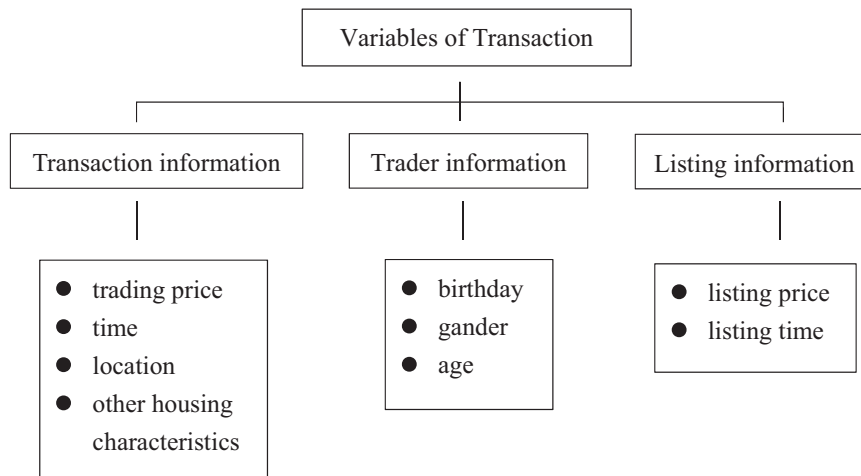
Fig. 1 Variables of the second-hand housing transaction.

gap, so the increase in $\frac{\partial p}{\partial \varphi}$ makes the trading price p more sensitive to the changes in information barriers.[5]

The positive relationship between trading price and information barriers suggests that the trust between sellers and buyers can effectively reduce the information barriers; thus, we propose the following hypotheses:

H1: During second-hand housing transactions, the negotiation price is negatively correlated with the degree of trust between both parties, which means that deals are more beneficial for the buyers.

H2: The effect of trust on negotiation price increases as the age difference between both parties increase.

Data and research method

Data source and data description. By 2017, the largest real estate agency company in China had over 8000 intermediary shops in 28 major cities and the largest market share in tier-one cities, such as Beijing, Shanghai, and so on. Since usage permissions are restricted, we obtained the monthly transaction data of 17 cities covering 7 to 22 months prior to July 2017, although each city's time horizon may vary. The average time span of 17 cities is 14.5 months. Each transaction has three different dimensions of variables: the trading price, the trading time, the housing location, and other housing characteristics in the dimension of transaction information; the birthplace, gender, and age in the dimension of trader information; the listing price and the listing time in the dimension of listing information (Fig. 1). Data with missing values, invalid sample[6], and related to non-residential housing are removed. Additionally, we winsorize variables at 0.5% bilateral level to avoid the disturbance of outliers.

Next, in order to determine the degree of trust between buyers and sellers, we match the birthplaces of traders to the CESS2000 survey. CESS2000 is a nationwide trust survey across 31 provinces. The survey collects 15000 questionnaires from entrepreneurs across 31 provinces, from which they select the five most trusted provinces.[7] Based on more than 5000 valid questionnaires, the survey combines the degree of trust for each company of all 31 provinces, and resulting in the respective province's degree of trust. CESS2000 has three features: first, the degrees of trust between two provinces are usually asymmetric, that is, the degree of trust degree of province A to province B is not equal to the degree of trust of province B to province A. It implies that the survey data reflect geographic impression rather than mutual recognition from non-repetitive games. Second, local entrepreneurs tend to have a higher degree of trust for their

province, also called "geographic discrimination" or "local bias." Zhang and Ke (2002), however, suggest that "geographic discrimination" or "local bias" cannot significantly affect the order of provinces' degree of trust in the national ranking. Third, since the survey only considers the five most trusted provinces, it is possible that all the interviewees from Province A did not include Province B in their top five, resulting in a potential underestimation of the level of trust from Province A to Province B. As a result, the total number of trust degrees between provinces is only 482, rather than the expected 961 (31×31) degrees of trust[8] (refer to Appendix II for more details).

Our data include traders from 31 provinces in China excluding Hong Kong, Macao and Taiwan. For each transaction, we construct the bilateral degree of trust by multiplying the unilateral trust (the degree of trust of province A to province B × the degree of trust of province B to province A). By sum of unilateral trust, we mean that the contributions of each part to the other part are the same and can be substituted for each other. Although there are different ways to build trust, the most competitive hypothesis is the "bucket law." It indicates that trust can only be built on the precondition of mutual trust, and the bonds of trust can easily fracture if one part lacks confidence in the other. Thus, compared with the sum of trust, the multiplication of trust is a better indicator to measure the overall degree of trust for each transaction.

After dropping the sample with missing values, we eventually get 100,964 transactions, which are distributed among 17 cities located in 12 provinces as shown in Table 1. Statistically, second-hand houses in most cities are purchased by non-local buyers[9], especially in emerging cities such as Shenzhen. This situation exacerbates the uncertainty of non-local buyers about the local housing market, while the default expectations of sellers toward non-local buyers are also aggravated by the "local bias" of sellers. Table 1 shows the average degree of trust[10] for each city, and overall, it correlates negatively with the proportion of non-local purchases. Due to the boom in non-local purchases, China's second-hand housing market exhibits a trend of low trust and high risk expectations between traders.

Research method. The Hedonic Price Method (HPM) is an essential approach for studying property prices (Bourassa and Hoesli, 2022). The HPM's fundamental concept is that housing values are jointly determined by various housing characteristics, such as housing structure, location, public services, market liquidity, and more. Multiple regressions are utilized to isolate the effects of individual factors on property values. The HPM is

Table 1 The sample distribution.

City	Province	Number of Observations	Proportion of Local Buyers	Proportion of Non-local Buyers	Average Degree of Trust
Beijing	Beijing	38237	42.89%	57.11%	0.098
Chengdu	Sichuan	8715	24.80%	75.20%	0.0086
Dalian	Liaoning	8199	50.86%	49.14%	0.0285
Dongguan	Guangdong	23	4.35%	95.65%	0.0803
Hangzhou	Zhejiang	5232	27.24%	72.76%	0.0461
Jinan	Shandong	3542	43.96%	56.04%	0.1785
Langfang	Shandong	849	6.71%	93.29%	0.0141
Nanjing	Jiangsu	6878	42.06%	57.94%	0.0634
Qingdao	Shandong	2147	39.36%	60.64%	0.1543
Xiamen	Fujian	257	19.46%	80.54%	0.0109
Shenzhen	Guangdong	3004	6.99%	93.01%	0.0493
Shengyang	Liaoning	219	30.14%	69.86%	0.0316
Tianjin	Tianjin	13600	61.58%	38.42%	0.0651
Wuhan	Hubei	4185	48.15%	51.85%	0.0035
Yantai	Shandong	912	58.77%	41.23%	0.1637
Changsha	Hunan	1407	23.60%	76.40%	0.00567
Chongqing	Chongqing	3558	37.61%	62.39%	0.00554

commonly used in economic analyses related to housing (Muehlenbachs et al., 2015). Harding et al. (2003) further incorporated personal factors of buyers and sellers into the HPM. They discovered that demographic characteristics such as gender, wealth, urgent demands such as children's schooling, and other factors can affect the transaction price of housing by influencing bargaining power. To this extent, research on how trust affects second-hand housing transactions can be helpful in analyzing the guiding mechanism of trust for micro-level transactions and provide empirical evidence for theoretical hypotheses. We construct a simple bargaining model to achieve this.

Based on the above theoretical analysis, the degree of trust negatively impacts the trading price. However, in reality, the housing price is affected by a multitude of factors. Though we already have several variables concerning the housing transactions, missing variables still create an empirical bias. Theoretically, we include essential control variables in addition to using the degree of trust as the primary explanatory variable to address the problem of missing variables. Specifically, we employ three main dimensions of control variables: (1) housing characteristics, including the number of bedrooms, floor level, living space, age of the property, property value, distance to subway stations, and whether the property is in a school district; (2) transaction costs, which are determined by whether the sellers have owned the house for more than five years and whether they own only one house; and (3) the market demand-supply theory dimension, which uses potential buyer visits to the house during the month it is sold as the supply proxy and newly listed houses within the same community during the same period as the demand proxy. Furthermore, the negotiation process is influenced by trust, which is usually built after a face-to-face meeting between buyers and sellers. For our study, the indicator reflecting the changes in the negotiation price is more suitable as it can significantly alleviate the issue of missing variables. Therefore, as our main contribution in compiling the variables, we initially generate the negotiation rate (NegR) as the dependent variable, which is

$$\text{the negotiation rate} = \frac{(\text{final listing price} - \text{transaction price})}{\text{final listing price}} \times 100\% \quad (4)$$

The sellers adjust the listing price of second-hand houses constantly with the changes in market, but the final listing price is the initial price at the beginning of the negotiation process. The negotiation premium is the difference between the final listing

price and the transaction price, and we derive the negotiation rate from Eq. (4). The negotiation rate reflects the result of the price game. More specifically, a 1% negotiation rate implies the seller concedes 1% of the final listing price. Thus, the deal is more beneficial to the buyer as the negotiation rate increases. The basic model is constructed as follows:

$$NegR_{ijt} = \beta_0 + \beta_1 Trust + \beta_2 X + \beta_3 Y + \delta_j + \gamma_t + \varepsilon_{ijt} \quad (5)$$

The subscripts i, j, and t stand for the second-hand house, the city, and the month in which the transaction was made, respectively. $NegR$ is the negotiation rate. $Trust$ is the bilateral degree of trust, the multiplication of two unilateral degrees of trust. X represents the control variables of housing characteristics, including the type of housing, floor, area, housing age, proximity to subway stations, proximity to schools, and whether "FIVE and ONLY."[11] Y is control variable of market demand-supply indicators for the month in which the transaction was made. The definitions of variables are shown in Table 2.

δ and γ are the city fixed effects and the month fixed effects, respectively, to prevent regression impacted by market changes in location and time dimensions; meanwhile, the constraints of comparison within groups eliminates the problem of samples with different time horizons. Furthermore, we apply the clustering robust standard error to the regressions to solve the autocorrelation problem for houses in the same community. β_1 stands for the effect of trust on the negotiation rate. A higher degree of trust facilitates a more favorable transaction price for the buyer, leading to a higher negotiation rate. Consequently, the coefficient of β_1 is expected to be positive.

In Section 4, we begin by using basic regressions from Eq. (5), with or without different categories of control variables, to demonstrate whether the trust level between sellers and buyers affects the trading price of second-hand houses. We then apply different kinds of robustness tests to verify the significance of the trust's effect on trading prices using various measurements of trust level and sample sizes. In addition, we use the dialect as an instrumental variable to solve the endogeneity problem. In Section 5, we further discuss how "Youth Capital" moderates the relationship between the trust level and trading prices. We also investigate the substitution effect of trust and local advantages as a potential explanation for second-hand housing prices. Finally, we discuss the impact of gender on the relationship between trust level and trading prices to illustrate gender heterogeneity.

Table 2 The definition of variables.

Category	Variables	Definition
Key independent variable	Trust	The bilateral trust degree
Housing characteristics	Room	Number of bedrooms
	Floor	The floor of housing
	Area	housing space (m^2)
	Age of house	Log of housing age
	Housing value	Log of total housing value
	Subway housing	Proximity to subway stations within 1 km
	School district housing	Whether in school district
Transition costs	FIVE	House held by the seller for more than five years
	ONLY	Only house the seller owns
Market demand-supply	Person-times	Potential buyers visiting the house during the month it is sold
	Newly listed housing	Newly listed houses within the same community during the month the house is sold

According to the local education policy, the real estate agents determine whether the second-hand housing is in a good school district or not.

Table 3 The descriptive statistics.

Variables	Observations	Mean	Std. Dev.	Min	Max
The degree of trust (buyer to seller)	100,964	0.203	0.185	0.002	0.777
The degree of trust (seller to buyer)	100,964	0.185	0.192	0.002	0.777
The bilateral multiplication of degree of trust	100,964	0. 069	0.109	0.000	0.335
Age difference (age of the seller – age of the buyer)	100,964	9.618	16.48	−64	70
The final listing price (10000 Yuan)	100,964	266.8	218.0	30	1,700
The transaction price (10000 Yuan)	100,964	261.0	213.2	30	1,390
The negotiation rate (%)	100,964	2.256	3.283	−48.07	49.75

As we only keep 3 decimal places, so the minimal value of this variable is 0.000, which is not actually 0.

Empirical results

Descriptive statistics. Table 3 shows the descriptive statistics of the dependent variable and major independent variables. The degree of trust from buyer to seller is 0.203 and that of seller to buyer is 0.185, which are both higher than the general average degree of trust (0.064) in CESS2000.[12] It indicates that these completed transactions have already been filtrated by trust, since the transactions with lower degrees of trust often fail due to the "conservative offer" problem and cannot be included in the database. The bilateral degree of trust for each transaction is generated by multiplying the above two degrees of trust, with a mean of 0.069 and a standard error of 0.109, so our tests have a sufficient range in the dimension of trust. On an average, the sellers are 9.6 years older than the buyers. The housing prices show an average final listing price of 2.668 million RMB, which is 58000 RMB higher than the average transaction price, indicating the average negotiation rate to be 2.256%.

Basic results. Table 4 demonstrates the basic empirical results by stepwise regressions used to verify the first hypothesis **H1**. Column (1) illustrates that the degree of trust can significantly increase the negotiation rate at the 1% significance level by fixing the month and city effects. When considering the effects of housing characteristics and transaction costs on the negotiation process, for instance, houses closer to school districts with the stronger demand usually have a lower negotiation rate, Columns (2) and (3) include a series of housing characteristics variables and transaction costs variables step by step. The significance and coefficient of trust remain constant. Additionally, the market's demand and supply may impact the relationship between negotiation and trust. Column (4) includes variables of person-times and newly listed houses to reflect the demand and supply respectively, and the impact of trust on negotiations remains robust. Housing transactions within the same community

typically exhibit strong autocorrelation. Therefore, Column (5) further controls the effect of community cluster and the results remain unchanged. According to Table 4, trust between traders effectively alleviates the information barriers and buyers with a higher discount factor capture a higher trust premium, which is consistent with our theoretical analysis.

Robustness tests. In order to test the robustness of basic results, we substitute the sum of unilateral trust in Column (1) of Table 5 with the multiplication of unilateral trust. The significance and coefficient are similar to those of Table 4. Additionally, trust may not always affect the negotiation linearly, and in different ranges, the economic effect of trust may have systematic bias. Based on Wu et al. (2014), we use the log of multiplication of trust as the key independent variable in Column (2) to eliminate such systematic bias, and the results are robust as well.

There are great difference in trust levels between the same provinces in CESS, for instance, Beijing has the highest degree of trust (57.9) from itself and the lowest degree of trust (7.4) from Shanghai. A major reason could be the block of information flow, especially in 2000, when the internet and the population movements were not common and developed in China. There is a deep impression in a few provinces with more communication, but it is vague in others. Such an unequal understanding is a probable cause of trust differentiation. Internet development and population mobility are gradually eradicating regional information barriers, and the regional impression is close to assimilation. Therefore, we use the provincial overall degree of trust (Appendix II) from CESS2000 to measure the trust level, which is the average degree of trust from other provinces to a specific province. Similarly, the multiplication of the provincial overall degree of trust is used as the key explanatory variable in Column (3), and again, the results are consistent with **H1**.

Table 4 Basic empirical results.

Variables	Negotiation rate				
	(1)	(2)	(3)	(4)	(5)
Trust	0.472***	0.409***	0.414***	0.392***	0.392***
	(0.0978)	(0.0977)	(0.0977)	(0.0977)	(0.0884)
Room		0.141***	0.142***	0.145***	0.145**
		(0.0178)	(0.0178)	(0.0178)	(0.0693)
Floor		−0.00507***	−0.00509***	−0.00515***	−0.00515***
		(0.00155)	(0.00155)	(0.00155)	(0.00192)
Area		0.00664***	0.00668***	0.00696***	0.00696**
		(0.000386)	(0.000386)	(0.000387)	(0.00284)
Age of house		0.0967***	0.103***	0.0827***	0.0827***
		(0.0168)	(0.0170)	(0.0171)	(0.0315)
Housing value		−0.575***	−0.574***	−0.599***	−0.599***
		(0.0275)	(0.0275)	(0.0276)	(0.0864)
Subway housing		0.156***	0.157***	0.161***	0.161***
		(0.0225)	(0.0225)	(0.0225)	(0.0326)
School district housing		−0.0263	−0.0272	−0.0152	−0.0152
		(0.0240)	(0.0240)	(0.0241)	(0.0324)
FIVE			−0.0675***	−0.0676***	−0.0676***
			(0.0262)	(0.0262)	(0.0260)
ONLY			0.0169	0.0228	0.0228
			(0.0225)	(0.0225)	(0.0229)
Person-times				−1.58e-05*	−1.58e-05
				(8.59e-06)	(1.06e-05)
Newly listed housing				−0.000226***	−0.000226***
				(3.24e-05)	(5.24e-05)
Month Fixed Effect	Yes	Yes	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes	Yes	Yes
Community Cluster	No	No	No	No	Yes
Observations	100,964	100,964	100,964	100,964	100,964
R-squared	0.105	0.112	0.113	0.113	0.113

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively; standard errors are shown in parentheses.

Lastly, another personal relationship related to trust is the one with a hometown fellow. The concept of hometown fellow is traditional in China, the hometown network based on geographical location and genetic relationship has played an important role in the expansion of industrial technology, the risk management of corporations, and the distribution of political resources in modern society (Fan & Li, 2014; Lu & Hu, 2014). Based on CESS2000 data, the local preference of trust indicates the degree of trust toward local provinces outweighs the degree of trust toward other provinces. There is a correlation between hometown fellow and a high degree of trust that leads to another competitive hypothesis of basic results: it is not the trust but the hometown fellow that affects the negotiation rate. In order to eliminate this possibility, we remove the sample of traders from the same cities[13] in Column (4). The results are still robust, suggesting that the impact of trust is not caused by the relationship of hometown fellow. Excluding the relationship of hometown fellow, trust plays a more significant role in the negotiation process.

Instrument variable (IV) tests. There is no direct relationship between trust and hometown fellow, indicating that the social network has a crucial role in building trust and generating economic benefits. In order to further exclude the endogeneity of unobserved social networks, we use the dialect of traders as an IV to run the two-stage regression by Cao et al. (2019). The pattern of dialects in China has gradually evolved and has no direct correlation to the modern market transactions (Gao et al., 2019). In regions with a same dialect, residents have similar geographical culture, making it easier and faster to build trust (Zhai, 2014). According to Dai et al. (2016), using the same dialect can improve

trust between managers. Thus, dialect can serve as an effective IV in our study.

The Chinese Dialects Dictionary has divided Chinese dialect patterns into three levels: dialect area, dialect region, and dialect district. The dictionary records the country-level dialects based on 1986 administrative divisions. We match the birthplace of traders with the distribution of dialects to confirm their dialects and generate a dummy variable using the same dialect as the IV. The results of the first stage in Columns (1), (3), and (5) demonstrate that using the same dialect positively correlates with the degree of trust. Moreover, the coefficients of the first stage increases as the culture distance decreases from Column (1) to (3) and then to (5). It indicates that culture plays an important role in trust, and higher similarity in culture has more impact on building trust. According to the results of the second stage in Column (2), (4), and (6), trust from cultural homology can significantly enhance the negotiation rate, which is consistent with the basic results.

Summary of results. This study empirically examines the impact of trust on second-hand housing transactions in China. First, our sample includes over 140,000 second-hand housing transactions across 17 cities from the largest real estate agent in China. It is an ideal scenario to examine the effect of trust premium on the second-hand housing market, as it represents a typical asymmetric information market. Next, in order to determine the degree of trust between bilateral traders in each transaction, we identify the birthplaces of the buyer and seller through their individual information (ID No.) and match them with the inter-local trust surveys by CESS. As a result, we examine the relationship between trust and price negotiation in each transaction

Table 5 Robustness tests with different dimensions.

Variables	Negotiation rate			
	(1)	(2)	(3)	(4)
Trust	0.186***	0.0333***	0.0321***	0.322***
	(0.0297)	(0.00452)	(0.00982)	(0.0884)
Room	0.145**	0.145**	0.306***	0.0408
	(0.0693)	(0.0694)	(0.0205)	(0.0281)
Floor	−0.00501***	−0.00486**	−0.00488***	−0.00543***
	(0.00192)	(0.00193)	(0.00156)	(0.00191)
Area	0.00696**	0.00697**	1.09e−05	0.0110***
	(0.00284)	(0.00284)	(2.29e−05)	(0.000830)
Age of house	0.0795**	0.0766**	0.0551***	0.107***
	(0.0315)	(0.0315)	(0.0214)	(0.0263)
Housing value	−0.601***	−0.602***	−0.391***	−0.676***
	(0.0864)	(0.0865)	(0.0332)	(0.0475)
Subway housing	0.161***	0.161***	0.124***	0.178***
	(0.0326)	(0.0326)	(0.0255)	(0.0309)
School district housing	−0.0152	−0.0154	−0.0447*	0.00708
	(0.0324)	(0.0324)	(0.0262)	(0.0321)
FIVE	−0.0690***	−0.0703***	−0.0257	−0.0776***
	(0.0260)	(0.0260)	(0.0215)	(0.0263)
ONLY	0.0246	0.0255	−0.00707	0.0163
	(0.0228)	(0.0228)	(0.0198)	(0.0240)
Person-times	−1.54e−05	−1.52e−05	−1.61e−06	−1.97e−05*
	(1.06e−05)	(1.06e−05)	(7.82e−06)	(1.03e−05)
Newly listed housing	−0.000225***	−0.000224***	−0.000183***	−0.000205***
	(5.24e−05)	(5.23e−05)	(3.73e−05)	(5.08e−05)
Month Fixed Effect	Yes	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes	Yes
Community Cluster	Yes	Yes	Yes	Yes
Observations	100,964	100,964	143,187	89,709
R-squared	0.114	0.114	0.104	0.105

Note: ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively; standard errors are shown in parentheses.

on the micro-level, while avoiding the endogeneity issue caused by missing variables in the macro research. Finally, by analyzing other dimensional information of traders, our study provides direct empirical evidence for the behavioral economics hypothesis of trust, which enables us to understand how trust is established and discern individual differences.

In summary, the empirical findings demonstrate strong evidence that the level of trust has a significant impact on the trading price of second-hand houses, regardless of the presence of control variables (as shown in Table 4). In order to verify the robustness of these findings, we substitute the original measurement of trust in Table 4 with different measurements in Columns (1) to (3) and adjust the sample size in Column (4) by excluding sellers and buyers from the same cities, as presented in Table 5. The results from Table 5 confirm the robustness of our empirical findings. Additionally, we address the endogeneity problem by using three different levels of dialect as IVs in Table 6. The IV tests demonstrate that trust based on cultural homology can significantly impact trading prices, which is consistent with the basic results.

Further discussion

The Moderating Effect of "Youth Capital". The negotiation rate is determined by the relative size of the discount factor θ, reflecting the risk tolerance of asset loss. On an average, buyers are much younger than sellers in our second-hand housing data.[14] It means, from the perspective of a whole life cycle, the buyer can earn more potential wealth in the future than the seller, and the same amount of asset loss takes a smaller proportion of the buyer's future income than that of the seller's. Therefore,

buyers have a higher risk tolerance than sellers, and the risk preference is indeed decreasing with age (Bonsang and Dohmen, 2015; Dohmen et al., 2017), hence the term "youth capital". Buyers with more youth capital influence the negotiation rate more positively, as well as with the increase of age difference, the relative value of θ is smaller and the negotiation rate is more sensitive to the change of trust. Thus, the age difference can be a moderating variable affecting the basic results.

As shown in Table 7, we measure age difference in three ways: dummy age difference in Column (1), where dummy is 1 if sellers are older than buyers, otherwise 0; continuous age difference in Column (2), where age of sellers minus age of buyers is adopted; and absolute age difference in Column (3), where the absolute value of age of sellers minus age of buyers is adopted. The empirical results show that the coefficients of interaction term of trust and age difference are significantly positive, which confirms that trust has a greater influence on negotiation when buyers are younger than sellers.

The substitution of trust and local advantages. The information barriers are an essential precondition of trust in negotiations. Traders have different degrees of trust demands because there are different levels of information barriers in the market. In the second-hand housing market, it is important to alleviate information barriers to ensure whether traders are local residents or not. The local residents have more informal or unofficial information about the local environment, housing details, related policies, and so on, which can reduce the failure risk of transactions by finding more suitable counterparties. Additionally, the local residents generally have deep-rooted social ties to hedge the

Table 6 IV tests with dialect.

Variables	Dialect Area		Dialect Region		Dialect District	
	(1)	(2)	(3)	(4)	(5)	(6)
	Degree of trust	Negotiation rate	Degree of trust	Negotiation rate	Degree of trust	Negotiation rate
Dialect	0.0745***		0.137***		0.141***	
	(0.000968)		(0.00174)		(0.00189)	
Trust		2.233***		0.904***		0.863***
		(0.461)		(0.165)		(0.150)
Room	0.00152**	0.143**	0.00194***	0.145**	0.00191***	0.145**
	(0.000674)	(0.0688)	(0.000513)	(0.0692)	(0.000491)	(0.0692)
Floor	−0.000145***	−0.00468**	7.50e-05*	−0.00502***	0.000132***	−0.00503***
	(5.16e-05)	(0.00194)	(4.22e-05)	(0.00193)	(4.19e-05)	(0.00192)
Area	3.94e-05**	0.00689**	1.34e-05	0.00694**	5.33e-06	0.00695**
	(1.78e-05)	(0.00282)	(1.22e-05)	(0.00283)	(1.11e-05)	(0.00283)
Age of house	0.00641***	0.0680**	0.00291***	0.0786**	0.00132**	0.0789**
	(0.000881)	(0.0318)	(0.000667)	(0.0315)	(0.000635)	(0.0315)
Housing value	0.00317***	−0.604***	0.00307***	−0.601***	0.00242***	−0.600***
	(0.00121)	(0.0859)	(0.000910)	(0.0862)	(0.000871)	(0.0862)
Subway housing	−0.00225**	0.166***	−0.00150*	0.162***	−0.00250***	0.162***
	(0.00105)	(0.0326)	(0.000797)	(0.0326)	(0.000770)	(0.0326)
School district housing	−0.000548	−0.0140	−0.000819	−0.0149	−0.00101	−0.0149
	(0.00119)	(0.0325)	(0.000877)	(0.0324)	(0.000843)	(0.0324)
FIVE	0.00315***	−0.0735***	0.00163**	−0.0693***	0.000338	−0.0691***
	(0.000914)	(0.0261)	(0.000719)	(0.0260)	(0.000694)	(0.0260)
ONLY	−0.00690***	0.0372	−0.00516***	0.0268	−0.00450***	0.0265
	(0.000783)	(0.0230)	(0.000607)	(0.0229)	(0.000591)	(0.0229)
Person-times	−1.53e-06**	−1.26e-05	−1.42e-06***	−1.49e-05	−1.32e-06***	−1.50e-05
	(6.51e-07)	(1.10e-05)	(4.54e-07)	(1.07e-05)	(4.12e-07)	(1.07e-05)
Newly listed housing	−1.62e-06	−0.000223***	3.90e-07	−0.000225***	7.52e-07	−0.000225***
	(1.03e-06)	(5.22e-05)	(9.58e-07)	(5.24e-05)	(7.95e-07)	(5.24e-05)
Month Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Community Cluster	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100,964	100,964	100,964	100,964	100,964	100,964
R-squared	0.219	0.006	0.502	0.009	0.530	0.009

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively; standard errors are shown in parentheses.

trading risk to some extent. Due to the local advantages, local residents have lower risk expectations and are less dependent on trust. Therefore, there is a substitute relationship between trust and local advantages.

Table 8 tests the substitution relationship of trust and local advantages. We list the second-hand housing transactions by local sellers and local buyers in Columns (1) and (2), respectively. Both coefficients of degree of trust (0.237 and 0.218) are significantly positive but smaller than the coefficient (0.392) in Column (5) of Table 4, which indicates that the local advantages can substitute the impact of trust to some extent. Conversely, traders will rely more heavily on trust against information barriers when there are no local advantages, and the impact of trust will be enhanced. Therefore, we selected the sample with non-local sellers and non-local buyers in Column (3), and found that the coefficient (2.200) is much higher than the other models. The substitution effect between trust and local advantages verifies the logic relationship between information barriers, trust bonds and negotiation rates; furthermore, it indicates that the lack of formal institutions is exaggerated by the population movement to generate more severe social problems.

The heterogeneity of gender on trust. According to behavioral economics, there is a systematic difference between males and females when it comes to economic behavior and decision making (Sent, van Staveren (2019)). In addition to the differences in social roles, another more convincing reason is the biological

differences between them, more specifically, the hormonal differences. Testosterone, as one of the most important androgens, can enhance rational thinking and aggressive impulses, resulting in a higher threshold for males to trust. By using a double-blind randomized control design, Boksem et al. (2013) found that testosterone decreases trust but increases generosity when repaying trust, which indicates that males can rationally select trusted targets and consciously build relationship bonds with them. However, oxytocin, as one of the most important estrogens, can reduce females' threshold of trust. Baumgartner et al. (2008) found that oxytocin can help participants to overcome social phobias and increase trust among humans. Specifically, oxytocin induces subjects to hand over more money in entrusted investment experiments. In general, males prudently investigate people's credit scores and treat trustworthy subjects differently. In contrast, females have a lower threshold of trust and universally trust people. These conclusions are consistent with Croson and Buchan's (1999) findings about gender and trust in an international experiment.

Table 9 investigates the performance of different gender traders during the transactions, and the results are in line with our expectations. It is difficult to establish trust based on regional impressions when female traders are involved. Column (1) shows that there is no significant impact of trust on negotiation rate. In Columns (2) and (3), transactions involving female traders demonstrate that trust improves the negotiation rate more significantly. Furthermore, the coefficient of trust is significantly

Table 7 The moderating effect of youth capital.

Variables	(1) Dummy Value	(2) Continuous Value	(3) Absolute Value
Trust	−0.0248	0.247**	0.556***
	(0.169)	(0.102)	(0.145)
Dummy age difference	−0.282***		
	(0.0297)		
Trust*age dummy	0.497***		
	(0.187)		
Continuous age difference		−0.00543***	
		(0.000825)	
Trust*age continuous		0.0128***	
		(0.00413)	
Absolute age difference			0.00327***
			(0.00105)
Trust*age absolute			−0.0106*
			(0.00597)
Room	0.151**	0.154**	0.143**
	(0.0687)	(0.0685)	(0.0703)
Floor	−0.00537***	−0.00536***	−0.00506***
	(0.00192)	(0.00192)	(0.00192)
Area	0.00689**	0.00681**	0.00702**
	(0.00281)	(0.00279)	(0.00287)
Age of house	0.103***	0.106***	0.0743**
	(0.0311)	(0.0304)	(0.0311)
Housing value	−0.601***	−0.598***	−0.600***
	(0.0856)	(0.0850)	(0.0871)
Subway housing	0.162***	0.163***	0.160***
	(0.0325)	(0.0324)	(0.0326)
School district housing	−0.0110	−0.0130	−0.0144
	(0.0323)	(0.0323)	(0.0325)
FIVE	−0.0448*	−0.0490*	−0.0731***
	(0.0261)	(0.0264)	(0.0264)
ONLY	0.0193	0.0192	0.0244
	(0.0228)	(0.0228)	(0.0228)
Person-times	−1.70e-05	−1.73e-05*	−1.55e-05
	(1.06e-05)	(1.05e-05)	(1.06e-05)
Newly listed housing	−0.000224***	−0.000226***	−0.000224***
	(5.22e-05)	(5.26e-05)	(5.23e-05)
Month Fixed Effect	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes
Community Cluster	Yes	Yes	Yes
Observations	100,964	100,964	100,964
R-squared	0.114	0.114	0.113

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively; standard errors are shown in parentheses.

Table 8 The substitution of trust and local advantages.

Variables	(1) Local sellers	(2) Local buyers	(3) Non-local sellers & non-local buyers
Trust	0.237**	0.218*	2.200***
	(0.0964)	(0.123)	(0.644)
Room	0.169**	0.216***	0.0241
	(0.0686)	(0.0729)	(0.0541)
Floor	−0.00422	−0.00372	−0.00575*
	(0.00257)	(0.00275)	(0.00300)
Area	0.00486*	0.00445	0.0153***
	(0.00275)	(0.00285)	(0.00176)
Age of house	0.110***	0.0827**	−0.0178
	(0.0375)	(0.0366)	(0.0444)
Housing value	−0.608***	−0.634***	−0.771***
	(0.0831)	(0.0974)	(0.0939)
Subway housing	0.171***	0.185***	0.121**
	(0.0361)	(0.0409)	(0.0543)
School district housing	0.000585	−0.0639	0.0362
	(0.0355)	(0.0415)	(0.0589)
FIVE	−0.131***	−0.0839**	0.0112
	(0.0338)	(0.0390)	(0.0449)
ONLY	0.0434	−0.0156	0.00870
	(0.0282)	(0.0336)	(0.0462)
Person-times	2.04e-05	6.33e-06	−3.19e-05**
	(1.47e-05)	(1.80e-05)	(1.43e-05)
Newly listed housing	−0.000530***	−0.000411***	−0.000156***
	(0.000101)	(0.000129)	(4.96e-05)
Month Fixed Effect	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes
Community Cluster	Yes	Yes	Yes
Observations	59,628	42,430	27,423
R-squared	0.114	0.139	0.104

Note: ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively; standard errors are shown in parentheses.

Summary of discussion. With the existence of information barriers, we propose a simple bargaining model for second-hand housing to examine the relationship between the degree of trust and the bargain price. Our results show that trust can significantly reduce the adverse effects of information barriers on housing transactions and increase the market value of second-hand housing. Furthermore, the degree of trust has a negative impact on the transaction price and a positive impact on the discount sellers' offer, which makes the transaction price more beneficial for buyers. Our empirical findings indicate that the negotiation rate of buyers is significantly enhanced with the increase in the degree of trust. The robustness tests and IV tests also confirm these results. Further discussion indicates that the "young capital" effect is an important factor behind the transaction price being more favorable for buyers. The anti-risk capabilities of buyers are stronger when they are younger than sellers, so they can capture a higher trust premium. Moreover, this effect has enhanced as the age gap between buyers and sellers widens, demonstrated by the significant positive coefficient of interaction term between age gap and the degree of trust. Furthermore, there exists a substitution relationship between trust and local advantages of traders. The information superiority and relational network of local traders can be used to effectively hedge against the transaction risk of

maximal when both the seller and buyer are males in Column (4), which is more than four times of the coefficient in female to female transactions. Our study examines the heterogeneous impact of trust on the negotiation rate by using a real transaction sample at the micro level to identify the systemic difference in trust between different genders.

Table 9 The heterogeneity of gender on trust.				
Variables	(1)	(2)	(3)	(4)
	Female buyers & female sellers	Female buyers & male sellers	Male buyers & female sellers	Male buyers & male sellers
Trust	0.104	0.161	0.548***	0.630***
	(0.173)	(0.157)	(0.187)	(0.169)
Room	0.0408	0.214***	0.0547	0.0724*
	(0.0548)	(0.0652)	(0.0551)	(0.0439)
Floor	−0.00246	−0.00400	−0.00774**	−0.00582*
	(0.00399)	(0.00306)	(0.00343)	(0.00335)
Area	0.0113***	0.00291	0.0127***	0.0107***
	(0.00170)	(0.00233)	(0.00160)	(0.00139)
Age of house	0.145***	0.0288	0.103**	0.115***
	(0.0436)	(0.0419)	(0.0490)	(0.0398)
Housing value	−0.784***	−0.580***	−0.666***	−0.670***
	(0.0860)	(0.0889)	(0.0819)	(0.0755)
Subway housing	0.122**	0.136***	0.192***	0.206***
	(0.0539)	(0.0461)	(0.0555)	(0.0459)
School district housing	0.0695	−0.0689	0.0128	−0.0182
	(0.0558)	(0.0494)	(0.0601)	(0.0493)
FIVE	−0.133**	0.0148	−0.0424	−0.116***
	(0.0547)	(0.0457)	(0.0521)	(0.0439)
ONLY	0.0116	0.0123	0.0568	0.0134
	(0.0468)	(0.0424)	(0.0471)	(0.0414)
Person-times	−4.53e-05***	−8.80e-06	−3.91e-05**	1.11e-05
	(1.51e-05)	(1.60e-05)	(1.69e-05)	(1.54e-05)
Newly listed housing	−5.56e-05	−0.000222***	−0.000205***	−0.000403***
	(6.69e-05)	(8.60e-05)	(6.00e-05)	(8.56e-05)
Month Fixed Effect	Yes	Yes	Yes	Yes
City Fixed Effect	Yes	Yes	Yes	Yes
Community Cluster	Yes	Yes	Yes	Yes
Observations	19,995	24,541	23,397	33,030
R-squared	0.107	0.120	0.117	0.120

Note: ***, **, and * represent significance at the 1%, 5%, and 10% level respectively; standard errors are shown in parentheses.

information barriers and substitute the influence of trust on housing transactions. However, non-local traders rely more heavily on trust bonds. When buyers and sellers are non-local residents, the coefficient of trust premium is much higher compared to the model of local traders. Moreover, the attitude toward trust varies by gender. Baumgartner et al. (2008) and Boksem et al. (2013) make biological explanations and believe that men are more concerned with the establishment and maintenance of trust than women. Our sub-sample regressions initially verify their inference by using real transaction data.

In summary, Table 7 examines the moderating effect of youth capital using three different measures of age gap. It finds that youth capital serves as an effective moderating variable in channeling trust to affect trading prices. Specifically, trust has a greater impact on negotiations when buyers are younger than sellers. Table 8 tests the substitution effect of trust and local advantages by dividing the sample into different groups. It explains that trust has more influence on non-local traders through local advantages. Finally, Table 9 investigates the heterogeneous effects of gender on trust and confirms that trading prices are more easily affected by the trust level among male traders, as males are harder to trust others.

Conclusion and policy implication
Trust is one of the most important social capital. Since the reform and opening up, the Chinese society has been experiencing a trust crisis, which not only hampers the macro-economic development but also exacerbates the economic behaviors of the micro subjects. Lack of trust is an essential reason for the distant relationships between people in modern society, and we can observe a

significant effect of its effect on micro transactions, such as the second-hand housing market. Due to the economic implications of trust, the second-hand housing market is an essential and representative research object.

This study investigates the effect of trust between traders on the negotiation process of second-hand housing markets across 17 cities in China. Our findings suggest that trust can alleviate the "conservative offer" problem caused by information barriers and affect the transaction prices by reducing potential transaction costs. The empirical results show that the degrees of trust between traders can significantly influence the negotiation rate, and buyers with a higher discount factor capture the trust premium more effectively. Moreover, the impact of trust is amplified by "youth capital," which means there is a greater gap between the discount factor of the seller and the buyer as well as the trust premium is more evident when the seller is much older than the buyer. Additionally, local advantage reduces information barriers and has a substitution effect on trust. Empirical results from the sub-samples demonstrate that trust is the most important factor in transactions between non-local sellers and non-local buyers. Furthermore, the impact of trust is influenced by gender, more specifically, males pay more attention on building trust building than females, while females generally trust others more readily than males. Therefore, trust has the greatest impact on the negotiation rate in transactions between male sellers and male buyers.

Our study examines the impact of trust on the information asymmetry market and provides new empirical evidence on trust premium in the Chinese second-hand housing market. The backwardness of formal institutions increases the transaction costs and hinders the housing transactions in China. Trust, as an

informal institution, compensates for the absence of a social credit system in China. Either trust or a social credit system is beneficial to promote the circulation of the housing market and reduce the transaction risk of traders. The study provides a theoretical foundation for the construction of a social credit system through identifying the mechanisms by which trust affects microeconomic behavior. Governments can reduce transaction friction and transaction costs by establishing an appropriate formal institution, such as a personal credit database.

There are still some works to be completed in the future, considering some limitations of this study. On one hand, we employ the negotiate rate as the proxy variable of trust premium to detect the effect of trust on housing transactions. However, this is still a highly controversial and inconclusive issue that how to accurately measure the level of trust. Trust is an extremely subjective concept, and different people may have standards of trust. Even for the same scoring criteria on trust, people may have different interpretations of the same score since some people are more likely to trust others. Therefore, it would be a huge step forward to have a sufficiently objective proxy variable to measure the degree of trust in the future. On the other hand, the sample used in this study has unavoidable limitations in some aspects. For instance, due to the business confidentiality of the real second-hand housing transaction data, our available data is limited to 17 cities and lacks a broader national sample. Additionally, the trust data from the CESS2000 survey has been out of data to some extent, afterwards there is no question about trust in this series of surveys. Therefore, it would be another great improvement to have more updated and broader range of data.

Data availability
Raw data for the second-hand housing transactions from the real estate agency are not available to preserve individuals' privacy and business confidential under the regulations of the real estate agency company. Since the data contain the personal information, such as ID number, name, gender, age and so on.

Notes
1 Data source: Wind database.
2 The housing developers in China are required to obtain a pre-sale certificate from the local government before they can commence selling new properties in the first-hand housing market. These pre-sale certificates specify the price range within which the developers can sell the properties to the buyers, leaving no room for negotiation unlike in the second-hand housing market. Hence, it is not possible to discuss the impact of trust on the transaction price between the buyers and sellers in the first-hand housing market.
3 In addition to culture explanation, Zhang and Ke (2002) implicate the effect of education and trade development on regional impression building. CESS2000 achieves the quantification of trust in regional impression. The data demonstrate two characteristics of huge differentiation and bilateral asymmetry. Regardless of any explanations, the degree of trust is the most important part of regional impression, guide the single-time housing transaction, and build trust relationship as a kind of identity card.
4 Eqs. (1) to (3) use the following symbols: p represents the trading price, a represents the lowest price a seller will accept, b represents the highest price a buyer will pay, $\delta 1$ represents the seller's discount factor, $\delta 2$ represents the buyer's discount factor, and φ represents the proportion of the rise premium.
5 Appendix I provides a more detailed verification for the assumption of the key hypothesis.
6 The invalid sample includes houses older than 1000 years, traders younger than 18, transaction values below 1000 RMB, and negotiation degree more than or less than 50%.
7 In the CESS2000 survey, interviewees were asked to "list and rank the five most trusted provinces in China based on their personal experiences". However, the survey

did not inquire about the reasons why certain individuals were trusted more than others. Nevertheless, Zhang and Ke (2002) identified some primary factors that may have influenced trust based on this survey. Firstly, people from more developed regions such as Beijing and Shanghai were found to be more trustworthy. Secondly, individuals were more likely to be trusted by others from their own regions, with the common phenomenon being "locals trust locals the most".
8 The unilateral degree of trust is a number between [0, 100] in CESS2000; in order to explain empirical results more easily, we divide the unilateral trust degree by 100 to form a range between [0, 1].
9 Non-local buyer means the birthplace of the buyer is different from the location of the second-hand housing.
10 The average degree of trust represents the mean of the multiplication of the degrees of trust for all the second-hand housing transactions in a specific city. For instance, there are 38237 transactions in Beijing and 38237 multiplications of degrees of trust.
11 In second-hand housing transactions, the buyer can enjoy tax benefits if the seller has held the house for more than five years or if it is the only house the seller owns. Essentially, the transaction taxes are part of the total transaction cost and are borne by the buyer. Therefore, "FIVE and ONLY" criterion has a substantial effect on the negotiation rate.
12 In Appendix II, the general average degree of trust between provinces is 0.064 (6.4/ 100).
13 Usually, the ID number does not change with the change of household registration place ("Hukou"), so we use the ID number to identify the birthplace of traders. However, the first generation of ID system in China was implemented in 1984 by using the registration place rather than birthplace as the location of ID number, which leads to migrant workers and students using their current place rather than their birthplace. To this extent, there may be some errors in our data.
14 Table 3 shows that sellers are nearly 10 years older than buyers in our data.

References
Agarwal S, Choi HS, He J, Sing TF (2019) Matching in housing markets: the role of ethnic social networks. Review of Financial Studies 32(10):3958–4004. https://doi.org/10.1093/rfs/hhz006
Agarwal S, He J, Sing TF, Song C (2019) Do real estate agents have information advantages in housing markets? Journal of Financial Economics 134(3):715–735. https://doi.org/10.1016/j.jfineco.2019.05.008
Alesina AF, La Ferrara E (2002) Who trusts others. Journal of Public Economics 85(2):207–234. https://doi.org/10.1016/S0047-2727(01)00084-6
Baumgartner T, Heinrichs M, Vonlanthen A, Fischbacher U, Fehr E (2008) Oxytocin shapes the neural circuitry of trust and trust adaptation in humans. Neuron 58(4):639–650. https://doi.org/10.1016/j.neuron.2008.04.009
Boksem MAS, Mehta PH, Van den Bergh B, Van Son V, Trautmann ST, Roelofs K, Sanfey AG (2013) Testosterone inhibits trust but promotes reciprocity. Psychological Science 24(11):2306–2314. https://doi.org/10.1177/0956797613495063
Bonsang E, Dohmen T (2015) Risk attitude and cognitive aging. Journal of Economic Behavior & Organization 112:112–126. https://doi.org/10.1016/j.jebo.2015.01.004
Bottazzi L, Da Rin M, Hellmann T (2016) The importance of trust for investment: evidence from venture capital. Review of Financial Studies 29(9):2283–2318. https://doi.org/10.1093/rfs/hhw023
Bourassa SC, Hoesli M (2022) Hedonic, residual, and matching methods for residential land valuation. Journal of Housing Economics 58:101870. https://doi.org/10.1016/j.jhe.2022.101870
Cao C, Xia C, Qian X (2019) Inter-regional trust and group off-site development: an empirical test based on firm boundary theory. Management World 35(01):179–191. https://doi.org/10.19744/j.cnki.11-1235/f.2019.0013. (in Chinese)
Cao C, Zhou D, Wu C (2015) Trust environmental, corporate governance and investment-cash flow sensitivity of private listed companies. Journal of World Economy 38(05):125–147. https://doi.org/10.19985/j.cnki.cassjwe.2015.05.008. (in Chinese)
Coppens T, Van Dooren W, Thijssen P (2018) Public opposition and the neighborhood effect: How social interaction explains protest against a large infrastructure project. Land Use Policy 79:633–640. https://doi.org/10.1016/j.landusepol.2018.08.045
Cramton PC (1991) Dynamic bargaining with transaction costs. Management Science 37(10):1221–1233. https://doi.org/10.1287/mnsc.37.10.1221
Croson R, Buchan N (1999) Gender and culture: International experimental evidence from trust games. American Economic Review 89(2):386–391. https://doi.org/10.1257/aer.89.2.386
Cumming D, Ge Y, Laid H (2020) Trust and quality uncertainty in global value chains. Journal of Multinational Financial Management 57-58:100662. https://doi.org/10.1016/j.mulfin.2020.100662
Dai Y, Xiao J, Pan Y (2016) Can "local accent" reduce agency cost?—A study based on the perspective of dialects. Economic Research Journal 51(12):147–160. (in Chinese)

de Groote JK, Bertschi-Michel A (2021) From intention to trust to behavioral trust: trust building in family business advising. Family Business Review 34(2):132–153. https://doi.org/10.1177/0894486520938891

Dohmen T, Falk A, Golsteyn BHH, David Huffman D, Sunde U (2017) Risk attitudes across the life course. The Economic Journal 127(605):95–116. https://doi.org/10.1111/ecoj.12322

Duflo E, Saez E (2002) Participation and investment decisions in a retirement plan: the influence of colleagues' choices. Journal of Public Economics 85(1):121–148. https://doi.org/10.1016/S0047-2727(01)00098-6

Eto K, Watanabe S, Kawabata H (2012) Economic profits enhance trust, perceived integrity and memory of fairness in interpersonal judgment. PLOS ONE 7(12):e51484. https://doi.org/10.1371/journal.pone.0051484

Fan Z, Li X (2014) Political connection of ministers and the allocation of fiscal transfer. Economic Research Journal 49(06):129–141. (in Chinese)

Fett AKJ, Gromann PM, Giampietro V, Shergill SS, Krabbendam L (2014) Default distrust? An fMRI investigation of the neural development of trust and cooperation. Social Cognitive and Affective Neuroscience 9(4):395–402. https://doi.org/10.1093/scan/nss144

Gao C, Huang J, Li K (2019) Dialects, migration history, and interregional trade. Management World 35(02):43–57. https://doi.org/10.19744/j.cnki.11-1235/f.2019.0019. (in Chinese)

Gneezy U, Leibbrandt A, List JA (2016) Ode to the sea: workplace organizations and norms of cooperation. Economic Journal 126(595):1856–1883. https://doi.org/10.1111/ecoj.12209

Guiso L, Sapienza P, Zingales L (2004) The role of social capital in financial development. American Economic Review 94(3):526–556. https://doi.org/10.1257/0002828041464498

Guiso L, Sapienza P, Zingales L (2009) Cultural biases in economic exchange? Quarterly Journal of Economics 124(3):1095–1131. https://doi.org/10.1162/qjec.2009.124.3.1095

Harding JP, Rosenthal SS, Sirmans CF (2003) Estimating bargaining power in the market for existing homes. Review of Economics and Statistics 85(1):178–188. http://www.jstor.org/stable/3211631

Hong H, Kubik JD, Stein JC (2004) Social interaction and stock-market participation. Journal of Finance 59(1):137–163. https://doi.org/10.1111/j.1540-6261.2004.00629.x

Knack S, Keefer P (1997) Does social capital have an economic payoff? A cross-country investigation. Quarterly Journal of Economics 112(4):1251–1288. https://doi.org/10.1162/003355300555475

Kurlat P, Stroebel J (2015) Testing for information asymmetries in real estate markets. The Review of Financial Studies 28(8):2429–2461. https://doi.org/10.1093/rfs/hhv028

Lei X, Rau P-LP, Huang H (2021) Regional differences in the effect of interpersonal relationship on trust and trustworthiness in China. PsyCh Journal 10(6):878–888. https://doi.org/10.1002/pchj.486

Lehn K, Poulsen A (1991) Mergers and acquisitions: the role of information barriers. Journal of Accounting and Economics 14(1):3–24. https://doi.org/10.1016/0165-4101(91)90003-V

Lehn K, Poulsen A (1998) Information asymmetry, information sources, and the valuation of IPOs. Journal of Corporate Finance 4(4):373–391. https://doi.org/10.1016/S0929-1199(98)00013-7

Li B, Li RYM, Wareewanich T (2021) Factors influencing large real estate companies' competitiveness: a sustainable development perspective. Land 10:1239. https://doi.org/10.3390/land10111239

Li L, Chau KW (2023) Information Asymmetry with Heterogeneous Buyers and Sellers in the Housing Market. Journal of Real Estate Finance and Economics. Published online 24:January 2023. 10.1007/s11146-023-09939-y

Li N, Li RYM, Nuttapong J (2022) Factors affect the housing prices in China: a systematic review of papers indexed in Chinese Science Citation Database. Property Management 40(5):780–796. https://doi.org/10.1108/PM-11-2020-0078

Liu F, Li L, Xue Y (2009) Trust, transaction cost and mode of trade credit. Economic Research Journal 44(08):60–72. (in Chinese)

Lu Y, Hu J (2014) The impact of "hometown" relationship between CEO and directors on the risk level of listed companies in China. Management World 03:131–138. https://doi.org/10.19744/j.cnki.11-1235/f.2014.03.012. (in Chinese)

Lützkendorf T, Speer TM (2005) Alleviating asymmetric information in property markets: building performance and product quality as signals for consumers. Building Research & Information 33(2):182–195. https://doi.org/10.1080/0961321042000323815

Muehlenbachs L, Spiller E, Timmins C (2015) The housing market impacts of shale gas development. American Economic Review 105(12):3633–3659. https://doi.org/10.1257/aer.20140079. pdfplus/

Park J, Lee H, Kim C (2014) Corporate social responsibilities, consumer trust and corporate reputation: South Korean consumers' perspectives. Journal of Business Research 67(3):295–302. https://doi.org/10.1016/j.jbusres.2013.05.016

Pavlou PA, Dimoka A (2006) The Nature and Role of Feedback Text Comments in Online Marketplaces: Implications for Trust Building, Price Premiums, and Seller Differentiation. Information Systems Research 17(4):392–414. https://doi.org/10.1287/isre.1060.0106

Pope JC (2008) Buyer information and the hedonic: the impact of a seller disclosure on the implicit price for airport noise. Journal of Urban Economics 63(2):498–516. https://doi.org/10.1016/j.jue.2007.03.003

Rhodes-Kropf M, Robinson DT, Viswanathan S (2005) Valuation waves and merger activity: the empirical evidence. Journal of Financial Economics 77(3):561–603. https://doi.org/10.1016/j.jfineco.2004.06.009

Rousseau DM, Sitkin SB, Burt RS, Camerer C (1998) Not so different after all: a cross-discipline view of trust. Academy of Management Review 23(3):393–404. https://doi.org/10.5465/amr.1998.926617

Rubinstein A (1982) Perfect equilibrium in a bargaining model. Econometrica 50(1):97–109. https://doi.org/10.2307/1912531

Rubinstein A (1985) A bargaining model with incomplete information about time preferences. Econometrica 53(5):1151–1172. https://doi.org/10.2307/1911016

Sent E, van Staveren I (2019) A feminist review of behavioral economic research on gender differences. Feminist Economics 25(2):1–35. https://doi.org/10.1080/13545701.2018.1532595

Stanley DA, Sokol-Hessner P, Banaji MR, Phelps EA (2011) Implicit race attitudes predict trustworthiness judgments and economic trust decisions. Proceedings of the National Academy of Sciences of the United States of America 108(19):7710–7715. https://doi.org/10.1073/pnas.1014345108

Song LX, Li RYM, Yao Q (2022) An informal institution comparative study of occupational safety knowledge sharing via French and English Tweets: languaculture, weak-strong ties and AI sentiment perspectives. Safety Science 147:105602. https://doi.org/10.1016/j.ssci.2021.105602

Van Lange PAM (2015) Generalized trust: four lessons from genetics and culture. Current Directions in Psychological Science 24(1):71–76. https://doi.org/10.1177/0963721414552473

Williamson OE (1993) Calculativeness, trust, and economic organization. Journal of Law and Economics 36(1, Part 2):453–486. https://doi.org/10.1086/467284

Wong SK, Yiu CY, Chau KW (2012) Liquidity and information asymmetry in the real estate market. Journal of Real Estate Finance and Economics 45:49–62. https://doi.org/10.1007/s11146-011-9326-z

Wu W, Firth M, Rui OM (2014) Trust and the provision of trade credit. Journal of Banking and Finance 39(2):146–159. https://doi.org/10.1016/j.jbankfin.2013.11.019

Xu JJ, Cenfetelli RT, Aquino K (2016) Do different kinds of trust matter? An examination of the three trusting beliefs on satisfaction and purchase behavior in the buyer–seller context. The Journal of Strategic Information Systems 25(1):15–31. https://doi.org/10.1016/j.jsis.2015.10.004

Zak PJ, Knack S (2001) Trust and growth. Economic Journal 111(470):295–321. https://doi.org/10.1111/1468-0297.00609

Zhai X (2014) The essence of trust and its culture. Chinese Journal of Sociology 34(01):1–26. https://doi.org/10.15992/j.cnki.31-1123/c.2014.01.010. (in Chinese)

Zhang C, Zhang F (2019) Effects of housing wealth on subjective well-being in urban China. Journal of Housing and the Built Environment 34:965–985. https://doi.org/10.1007/s10901-019-09651-5

Zhang, F (2017) Modeling the Housing Market and Housing Satisfaction in Urban China. Shanghai Jiaotong University Press, Shanghai

Zhang F, Zhang C, Hudson J (2018) Housing conditions and life satisfaction in urban China. Cities 81:35–44. https://doi.org/10.1016/j.cities.2018.03.012

Zhang W, Ke R (2002) Trust in China: a cross-regional analysis. Economic Research Journal 10:59–70. https://doi.org/10.2139/ssrn.577781. (in Chinese)

Zhou X, Gibler K, Zahirovic-Herbert V (2015) Asymmetric buyer information influence on price in a homogeneous housing market. Urban Studies 52(5):891–905. https://doi.org/10.1177/0042098014529464

Author contributions
FZ: Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; Drafting the work or revising it critically for important intellectual content. HZ: Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; Drafting the work or revising it critically for important intellectual content. YZ: Final approval of the version to be published; Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical approval
This article does not contain any studies with human participants performed by any of the authors.

Informed consent

This article does not contain any studies with human participants performed by any of the authors.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-023-01927-0.

Correspondence and requests for materials should be addressed to Yun Zhang.

Reprints and permission information is available at http://www.nature.com/reprints

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.