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Leave or Stay? Antecedents of High-level Talent Migration in the Pearl River Delta Megalopolis of China: From a Perspective of Regional Differentials in Housing Prices

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Abstract: Rapid urbanization and population growth have triggered an increase in urban housing demand and rising housing prices, which can influence the migration intention of high-level talents. Much work within the literature has focused more on the migration of the general public. However, antecedents of migration intention and the impact of housing prices on the migration of high-level talents remain unclear. Therefore, based on the push-pull theory, this study investigates the influencing factors of talent migration intention and explores the role of housing prices. This study reveals a complex mechanism underlying migration decisions by using logistic regression models and survey data of high-level talents in the Pearl River Delta (PRD) megalopolis of China. The results indicate that: 1) in high house-price regions, social integration is the primary push factor, and the main factors for retaining talents are the expectation of future work and intimate family relationships; 2) in medium house-price regions, the main factors that attract talents are the current salary level and close family ties; 3) in low house-price regions, living convenience is a determining factor in retaining talents. This study provides a new perspective for talent mobility research and offers valuable inputs for retaining and attracting talents in different economic development regions. Findings are of great significance for formulating talent introduction policies and forming a new pattern of rational spatial docking and effective allocation of human resources.

Keywords: destination choice; migration intention; high-level talents; house-price pressure; push-pull theory; the Pearl River Delta megalopolis of China

1 Introduction

Rapid urbanization and population growth have led to global economic growth, and increased demand for urban housing (Cleave and Arku, 2020). The rapid rise in housing prices not only directly affects the cost of living but also triggers internal labor migration (Chen et al., 2019). The mobility of ordinary labor induced by housing prices has been widely discussed (Gu, 2021). Evidence has emerged that the demographic impact of migrants would promote the demand for housing and, in turn, stimulate the housing market, resulting in rising housing prices (Creighton, 2013). Xu et al. (2022) indicate that housing prices have an inverted U-shaped effect

on labor mobility. Rising housing prices at lower levels can promote labor inflows, while excessive prices will inhibit it. However, the effect of this phenomenon on the out-migration of high-level talents is complex.

High-level talents can be defined as those who have abundant knowledge reserves and profound professionalism and are considered regional 'think tanks' (Green and Hogarth, 2017). Different from ordinary labor in terms of earning ability and human capital endowment, high-level talents play an extremely crucial role in urban competitiveness (Green and Hogarth, 2017). 'Brain gain' and 'brain drain' usually influence urban economic, educational, and technological development (Li et al., 2020). Therefore, the migration of high-level talents plays a vital role in regional development, which can change the spatial structure of cities and reorganize migration communities (Huang, 2022). Much work within the literature focused more on the migration of the general public (Kerr et al., 2016; Xiao et al., 2020; Zhang et al., 2020). However, the determinants of high-level talent migration intention are insufficiently documented, and few studies analyzed the factors that influence their migration from the perspective of housing prices. Therefore, this study investigates the determinants of high-level talent migration intention and explores the impact of housing prices. Specifically, this research aims to address the following three research questions:

RQ1: What are the determinants of high-level talent migration intention and destination choice?

RQ2: Are there regional differences in the factors influencing high-level talent migration intention and destination choice?

RQ3: What role do housing prices play in high-level talent migration intention and destination choice?

2 Literature Review and Hypothesis Development

Push-pull theory, which was transformed from Ravenstein (1885)'s 'The Laws of Migration', is one of the most influential theories on population mobility. Ever since it was officially proposed, the migration process was regarded as a result of the interactions between the 'push' factors of the original residence and the 'pull' factors of the destination (Veronese et al., 2021). Population mobility results from the combined effect of all these factors (García-Arias et al., 2021). In addition,

with the acceleration of urbanization and rapid economic development, the impact of housing prices on migration decisions can not be ignored (Song and Wu, 2022).

2.1 The push factors

Previous studies have shown that push factors are life conditions that make individuals dissatisfied with the present location relative to the potential destination (Mohamed and Abdul-Talib, 2020). It is stated that the push factors, referring to institutional, economic, social, and cultural inclusion, significantly influence the migration decision (Mlambo and Adetiba, 2020).

As social capital theory predicts, high-level talents pursue the realization of personal value, while integration in the origin city can provide social resources (Gu, 2021). These social resources exist in the relationship between individuals and even reduce migration risks. Existing studies have revealed a complicated mechanism of institutional integration in migration (Sahatcija et al., 2020). Mobility is restricted by the requirements of qualifications stipulated by the national policy in China. The *hukou* (the household registration issued by the Chinese government to Chinese citizens) system manages and controls mobility (You et al., 2018). The invisible wall between different *hukou* categories leads to distinctions in social welfare benefits, education, retirement benefits, and housing subsidies (Gu et al., 2020). Nevertheless, these institutional factors may have a different impact on high-level talents. High-level talents are conduits for a city's multi-dimensional exchanges in technology, policy, knowledge, and finance (Shi and Lai, 2023). There are specialized policies, such as unique application systems, for high-level talent migration (Xu et al., 2022).

Apart from institutional factors, the impacts of economic, social, and cultural inclusion on migration are well recognized in the existing literature (Liu et al., 2020). To integrate into the origin city, it is necessary to economically integrate into the consumption level of the city (Wang et al., 2020). Otherwise, migrants in cities with higher costs or lower quality of life tend to move to other cities that provide a higher quality of life and welfare (Ewers and Shockley, 2018). The attractiveness of destination cities will be negated by a high cost of living (Gu, 2021). Compared with ordinary immigrants, high-level talents contribute more to human capital, possess more resources, and have higher income levels,

which makes them pursue a high-quality lifestyle (MacLachlan and Gong, 2022). Additionally, during the process of assimilation, economic, social, and cultural inclusion can facilitate the accumulation of social capital in the origin city (Bashar, 2022).

Social inclusion is characterized as individualism and assimilation, primarily determined by social inclusiveness, i.e., social environment and psychological belonging (Li et al., 2021). Furthermore, socio-cultural conditions are essential to an individual's migration intention (Zou and Deng, 2022). Communication barriers, social segregation, and cultural isolation can marginalize individuals (Sahatcija et al., 2020). Integration into the cultural nuances of the origin city, such as diet, dialect, and customs, is essential when people move from one city to another (Zhou and Hui, 2022). High-level talents with higher cultural literacy are more 'insensitive' to the economic, social, and cultural status of the origin city (Green and Hogarth, 2017). Based on these discussions, this study postulates the first hypothesis:

H1. *The push factors in the origin city can strengthen the willingness of high-level talent flow and prompt them to migrate.*

2.2   The pull factors

The pull factors are those attributes of potential destinations that make cities more attractive (Gu et al., 2022). They are the 'catalysts' that promote migration. Previous studies divided the pull factors into social, economic, and family factors (Xu et al., 2022). In migration decisions, social factors often refer to amenities, life convenience, and recreational facilities. The importance of complimentary amenities, including the entertainment scene and the broader consumer base, is well-established in previous empirical studies (Zhu et al., 2021). In the process of utility maximization, high-level talents attach great importance to social factors (Chen and Liu, 2016). Talents tend to pursue a better quality of life to meet their daily expenditures, while personal satisfaction with the quality of entertainment can be a tension of migration (Gu, 2021). Likewise, traffic conditions, educational facilities, and medical care appeal to talents, thereby pulling them to a destination city (Li et al., 2020).

Economic factors focus on wages, personal development prospects, and human capital accumulation. Talents with the ability to obtain high wages are more likely to seek better job opportunities or higher-paying jobs (Wong et al., 2017). According to the utility theory, individual migration decisions depend on the differences in regional socioeconomic status (Regmi et al., 2020). Meanwhile, social economists demonstrate that the migration intention of high-level talents is closely related to economic incentives and involves a more intricate mechanism (Chen and Wang, 2019). As the importance of income is well-established, higher wages, as the typical centripetal force, were also found to increase the probability of talent migration (Wang et al., 2017a). Expected incomes, including dominant and invisible income, are endogenous to internal migration and the consideration of choosing destinations (Xie and Chen, 2018). High-level talents with high human capital endowments are more interested in career pursuits, and their expected incomes are shaped by the economic context (Chen and Wang, 2019).

Family factors mainly involve personal emotions and family background. Migration decisions usually consider various factors, such as supporting older adults and kids, children's education, and spouses' work (Choi et al., 2021). Although economic and social factors are essential, some scholars believe family factors are the most influential (Niu, 2022). Studies highlighted the linkage between family attachment and migration intention and asserted that family attachment to the destination city could increase migration intention (Chen and Liu, 2016). Chinese people are considered to have a stronger sense of family and attach great importance to family affection (Gu, 2021). Hence, the following hypothesis is established:

H2. *The pull factors in the destination city can strengthen the willingness of high-level talent flow and prompt them to migrate.*

2.3   House-price perception

Previous studies recognized that house prices could impact migration (Malmberg and Clark, 2021). For large cities, inhibiting factors such as living pressure, higher cost of living, and traffic congestion hinder population inflow, making housing price the dominant factor affecting migration intention (Wang et al., 2020). In the new economic geography model, housing prices in a particular area were pointed to affect the relative utility of labor (Taima and Asami, 2020). Expensive neighborhoods may inhibit inflows, while the expectation of arbitrage could promote inflows (Peng and Tsai, 2019).

Some scholars believed that the relationship between housing prices and normal labor mobility is generally an inverted U-type, where rising housing prices at lower levels can promote population inflows, while excessive housing prices tend to go against this trend (Gu, 2021). Other researchers argued that housing prices play a role in screening human capital, making high-level talents concentrate in areas with high housing prices (Mirkatouli et al., 2018).

As housing prices continuously rise, the impact of residential pressure, dwelling satisfaction, and psychological stress on migration intention can not be ignored (Xie and Chen, 2018). Migration decisions are influenced by expected costs, i.e., house rent, living expenses, and housing loans (Taima and Asami, 2020). As the welfare dissipation effect illustrates, high housing prices in the origin city directly affect accommodation costs and living expenses indirectly, reducing household wealth (Tang et al., 2020). High accommodation and living costs can bring economic pressure and increase psychological stress (Malmberg and Clark, 2021). It may cause anxiety, irritability, and depression, significantly inhibiting subjective well-being and life satisfaction and pushing individuals out of the origin city (Kerr et al., 2016).

Although most studies have suggested a 'negative' impact of housing prices on migration intention, it appears that high housing prices also have a 'positive' effect (Garriga et al., 2021). Individuals' mobility decisions mainly rely on expected utility, referring to social benefits generated after settling down, e.g., net income, pension, and housing security (Zhang et al., 2020). It can be affected by expected income in the destination city, including 'dominant income' (e.g., employment opportunities) and 'invisible income' (e.g., the enjoyment of social benefits) (Song et al., 2022). According to the wealth accumulation effect, better medical and health facilities, better educational opportunities, and high housing prices can increase household wealth (Xu et al., 2022).

In addition, housing prices and residential rentals directly impact the living environment (Molloy et al., 2017). Houses with higher prices or higher rents often mean larger living space, more convenient transportation, and better environmental conditions (Dong et al., 2017). A good living environment and quality can improve people's satisfaction with their dwellings. The

feeling of the physical environment, safety, household size, overcrowding, and dwelling size can predict residential satisfaction (Chen et al., 2020). While high-level talents with rich human capital have particular pursuit for a better life, and seeking relatively higher safety, comfort, and functional homes are their goals (Mirkatouli et al., 2018). Hence, the following hypothesis is developed:

H3. House-price perception in the origin city can strengthen the willingness of high-level talent flow and prompt them to migrate from higher house-price regions to lower house-price regions.

3   Materials and Methods

3.1   Data sources and study area

Data used in this research were derived from a survey of high-level talents in the Pearl River Delta (PRD) megalopolis of China, including Guangzhou, Shenzhen, Zhuhai, Foshan, Zhongshan, Dongguan, Zhaoqing, Jiangmen, and Huizhou in Guangdong Province during September 2018 to April 2019. Fig. 1 shows the locations of nine cities.

These cities were selected for the following reasons. First, as a dynamic world-class urban agglomeration, the PRD megalopolis is the most active region for economic development and technological advancement in China. High levels of urbanization have caused a rapid rise in housing prices. The PRD megalopolis is a representative sample area with geographic differences in housing prices. Second, there are first-tier, second-tier, and third-tier cities within the PRD megalopolis. Significant differences, such as the scale of the floating population, economic aggregates, household registration policies, and housing prices, can result in diversified migration intentions and behaviors. Third, the PRD megalopolis was selected for the research because of its high proportion of nonlocals (Tao et al., 2014). Ultramodern cities, technology-focused industries, welfare policies, and plentiful employment opportunities induce large inflows of migrants, especially high-level talents. As an area with a large number of high-level talents, these cities were well suited for this study.

In addition, according to the average price of commercial houses from 2010 to 2019 (Anjuke, 2019), the nine cities were classified into high-, medium- and low-priced regions. Shenzhen was defined as a high housing
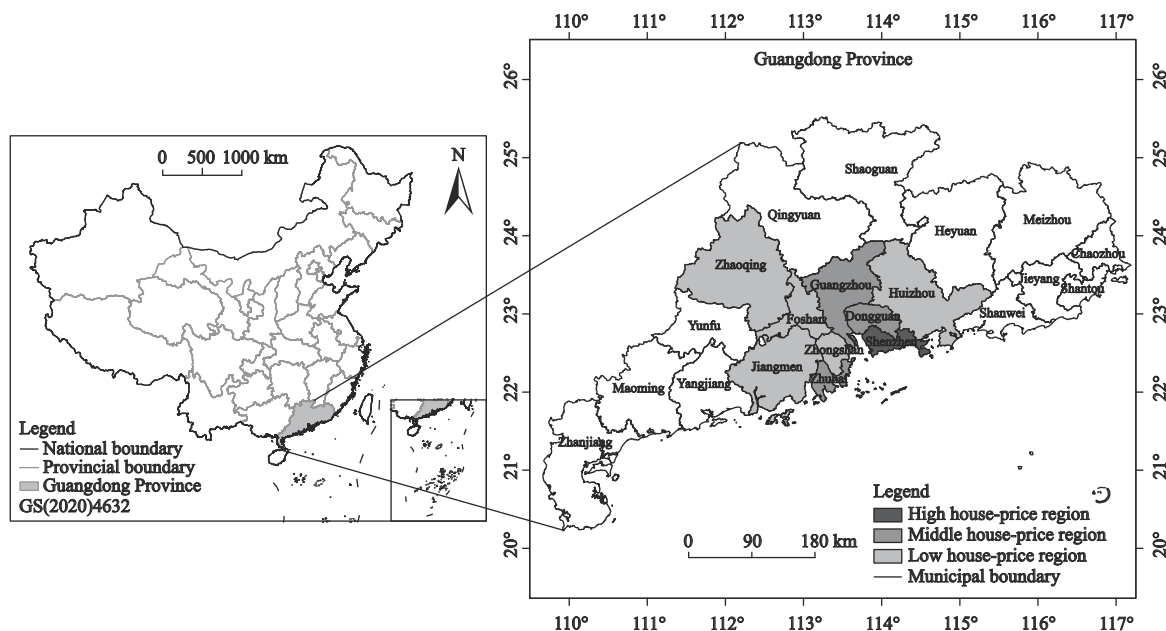
Fig. 1   Locations of Pearl River Delta Megalopolis and the selected cities with different housing prices

price region. The average housing prices in Guangzhou, Zhuhai, and Dongguan were approximately one-third of that in Shenzhen, so they were regarded as medium housing price regions. Moreover, Foshan, Zhongshan, Huizhou, Zhaoqing, and Jiangmen, where the average housing prices were only one-sixth of that in Shenzhen, were defined as low house-price regions.

3.2   Variables and measurements

This study illustrated the migration intention and destination choice of high-level talents. Migration intention (refers to the intention of high-level talents willing to leave the current city) and migration behavior (refers to the choice of the destination city) were dependent variables. Meanwhile, vital independent variables were divided into push factors, pull factors, and house-price perception. Push and pull factors were defined based on origin and destination cities. The push factors include eight indicators, such as household registration and economic integration. The pull factors include ten indicators, such as wage and expected income. House-price perception includes eleven indicators, such as residential pressure and psychological stress. Table 1 shows examples of the measurements.

3.3   Data collection

This research identified six types of high-level talents, including high-level professional talents, outstanding

overseas students, academic leaders, innovation and entrepreneurial team leaders, high-level enterprise managers, and outstanding cultural and art practitioners (Cui et al., 2016). The survey was distributed within the relevant industry development forums and alumni platforms by combining multistage cluster sampling and snowball sampling.

The primary sampling units were universities, government, and high-tech enterprises. First, this research selected high-level talents from different industries living in the nine cities of PRD megalopolises for the initial questionnaire distribution. Then, respondents were asked to spread questionnaires to other talents through personal relationships. This process was controlled to ensure that each met the criteria: living in PRD megalopolis. Moreover, based on the local talent population, the minimum sample size was calculated by using the Scheaffer equation (Wang et al., 2017b, 2021). The formula is as follows:

$$n = \sigma^2 \Big/ \left(\left| \widehat{\theta} - \theta \right|^2 \Big/ Z_{\frac{\alpha}{2}}^2 + \sigma^2/N \right) \tag{1}$$

where n denotes the required sample size, σ denotes the population standard deviation, $\widehat{\theta} - \theta$ denotes the error of estimation, Z denotes the value in the truncated $\frac{\alpha}{2}$ region of the right tail of the standard normal distribution, N denotes the total talent population size.

Finally, 538 questionnaires were collected with 503 valid samples, including 238 samples in high house-

Table 1 Examples of variable measurement

Variable	Measurement
Dependent variable	
Intention	Intention to move (arithmetic average): no intention to migrate (1–2) = 0; have an intention to migrate (3–5) = 1
Behavior	The choice of the destination city: high house-price regions = 0; medium house-price regions = 1; low house-price regions = 2
Independent variable	
Personal characteristic factors	
Gender	Gender of the respondent: male = 1; female = 2
Age	Respondent's age range: under 30 = 1; 31–35 = 2; 36–40 = 3; 41–50 = 4; over 51 = 5
Marriage	Marital status: unmarried=1; married=2; divorced and other=3
Working years	How many years the respondent has worked after graduation: less than 1 yr = 1; 1–3 yr = 2; 3–5 yr = 3; 5–10 yr = 4; more than 10 yr = 5
The push factors	
Household registration	Relative to the destination city, whether the respondent can get a *hukou* in the origin city more easily: no = 1; yes = 2
Economic integration	Relative to the destination city, the degree of economic integration in the origin city: unable to integrate = 1; hard to integrate = 2; initial integration = 3; greater integration = 4; fully integrated = 5
Social integration	Relative to the destination city, the degree of social integration in the origin city: unable to integrate = 1; hard to integrate = 2; initial integration = 3; greater integration = 4; fully integrated = 5
Cultural integration	Relative to the destination city, the degree of cultural integration in the origin city: unable to integrate = 1; hard to integrate = 2; initial integration = 3; greater integration = 4; fully integrated = 5
The pull factors	
Wage	Relative to the origin city, annual income (yuan(RMB)) in the destination city: ranges from 1 to 5 (the greater the value, the higher the wage)
Expected income	Relative to the origin city, attitude towards achieving expected income in the destination city: very pessimistic = 1; pessimistic = 2; neutral = 3; optimistic = 4; very optimistic = 5
Life convenience	Relative to the origin city, the level of infrastructure in the destination city: ranges from 1 to 5 (the greater the value, the better the infrastructure)
Number of relatives and friends	Relative to the origin city, the number of relatives/friends in the destination city: ranges from 1 to 5 (the greater the value, the more the number)
Spouse/parents/children work and live locally	Relative to the origin city, whether spouse/parents/children can better work or live in the destination city: no = 1; yes = 2
Length of residence	Relative to the origin city, the duration of residence in the destination city: ranges from 1 to 5 (the greater the value, the longer the duration of residence)
House-price perception factors	
Residential pressure	Pressure perception of housing expenditure: ranges from 1 to 5 (the greater the value, the greater the pressure)
Psychological stress	Psychological pressure caused by housing prices: ranges from 1 to 5 (the greater the value, the greater the pressure)
Satisfaction with the dwelling	Satisfaction with dwelling unit: ranges from 1 to 5 (the greater the value, the greater the satisfaction)
Living space	Housing area: less than 20 m^2 = 1; 20–45 m^2 = 2; 45–80 m^2 = 3; 80–100 m^2 = 4; more than 100 m^2 = 5
Number of houses owned	Number of home ownership zero = 1; one set = 2; two sets = 3; three sets = 4; more than four sets = 5

price regions, 191 in medium house price regions (with 114 in Guangzhou, 48 in Dongguan, 29 in Zhuhai), and 74 in low house price regions (with 19 in Foshan, 15 in Zhongshan,13 in Huizhou, 14 in Zhaoqing, 13 in Jiangmen). The socio-demographic analysis of the sample is shown in Table 2.

3.4 Validation and method

Cronbach's α coefficient is an effective measure of reliability and internal consistency. The α-value is between 0 and 1. Empirically, an α-value greater than 0.7 represents high reliability. Five independent variables (i.e., the number of family members and migration distance) were removed to reach the reliability requirement, resulting in a total α-value of 0.898. The push factors' α-value was 0.792, the pull factors' α-value was 0.820, and the house-price perception's α-value was 0.834. Structural validity analysis was undertaken to measure

Table 2   Profile of talents in Pearl River Delta Megalopolis

Classification indexes	Total		High house-priceregions		Medium house-price regions		Low house-priceregions	
	N	Percentage / %	N	Percentage / %	N	Percentage / %	N	Percentage / %
Gender								
Male	290	57.65	150	63.03	104	54.45	36	48.65
Female	213	42.35	88	36.97	87	45.55	38	51.35
Age								
Under 30	252	50.10	136	57.14	87	45.55	29	39.19
31–35	146	29.03	63	26.47	53	27.75	30	40.54
36–40	67	13.32	28	11.76	28	14.66	11	14.86
41–50	29	5.77	8	3.36	17	8.90	4	5.41
Over 51	9	1.79	3	1.26	6	3.14	0	0.00
Marital status								
Unmarried	217	43.14	112	47.06	78	40.84	27	36.49
Married	279	55.47	125	52.52	108	56.54	46	62.16
Divorced and other	7	1.39	1	0.42	5	2.62	1	1.35
Education								
Undergraduate	287	57.06	121	50.84	113	59.16	53	71.62
Master	197	39.17	107	44.96	70	36.65	20	27.03
Doctor	19	3.78	10	4.20	8	4.19	1	1.35
Work industry								
University/Institution	41	8.15	16	6.72	16	8.38	9	12.16
Finance/Insurance	46	9.15	23	9.66	21	10.99	2	2.70
Construction industry	125	24.85	63	26.47	46	24.08	16	21.62
High-tech industry	88	17.50	46	19.33	40	20.94	2	2.70
Government	89	17.69	54	22.69	17	8.90	18	24.32
Others	114	22.66	36	15.13	51	26.70	27	36.49

the degree of compliance between the survey results and the theory. It is mainly based on factor analysis and evaluated by the Kaiser—Meyer—Olkin (KMO) and Bartlett sphericity tests (Sessler et al., 2002). The results showed that the KMO values were more significant than 0.7, and the significance was 0.000, indicating that the validity was effective.

Regression models were used to investigate the factors affecting migration intention and behaviors. Clustering the variables with high correlation and performing dimensionality reduction before regression, ten independent variables were eliminated, such as education level, career satisfaction, and house-purchase intention. The extracted factors collectively explained 89.26% of the total information, and the cumulative contribution rate reached 85%. Finally, 19 variables were left for further analysis. Since two dependent variables have dual or multiple characteristics, the binary

and multiple logistic regression models were introduced to address the determinants of high-level talent migration intention using SPSS 20.

4   Results and Analysis

4.1   Migration intention analysis
Fig. 2 shows that nearly half of the high-level talents were willing to migrate. Moreover, as demonstrated in Table 3, the regression model in each region has consistency and significant explanatory power. The results show that factors that impact the migration intention of talents vary significantly across regions. Detailed results and analyses are as follows.

4.1.1   Determinants of talent migration intention in high house-price region
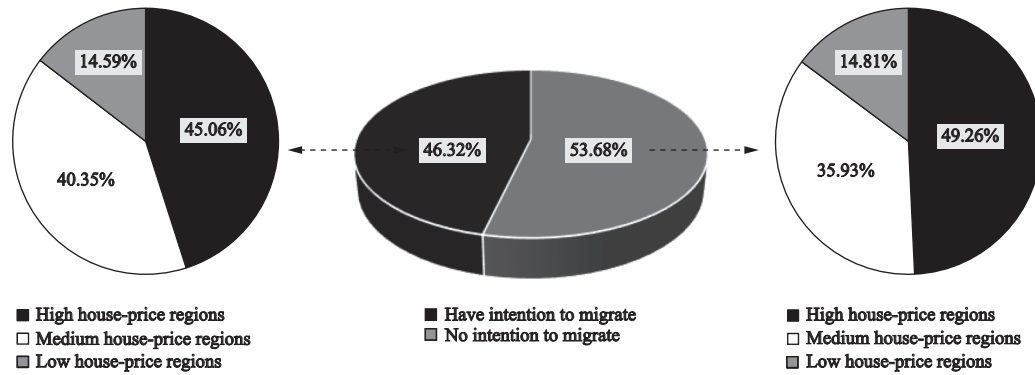Among personal characteristics, working years (β = –0.352, $P < 0.10$) strongly correlate with migration in-

Fig. 2 Migration intention of talents in each region of Pearl River Delta Megalopolis

Table 3 Migration intention analysis of talents in Pearl River Delta Megalopolis

Independent variables	High house-price regions		Medium house-price regions		Low house-price regions	
	β	SE	β	SE	β	SE
Personal characteristics						
Gender	−0.287	0.417	**−0.761****	0.462	**−0.824*****	0.404
Age	−0.366	0.379	**−0.538***	0.319	0.563	0.106
Marriage	−0.303	0.522	−0.109	0.570	−0.359	0.513
Working years	**−0.352***	0.273	−0.042	0.243	−0.101	0.117
The push factors						
Household registration	−0.155	0.458	**−0.735*****	0.530	−0.455	0.583
Economic integration	−0.020	0.269	−0.040	0.238	−0.389	0.303
Social integration	**−0.543****	0.234	−0.071	0.302	−0.402	0.130
Cultural integration	−0.292	0.250	0.443	0.281	−0.324	0.251
The pull factors						
Wage	−0.359	0.318	**−0.604****	0.292	0.419	0.167
Expected income	**0.421***	0.250	−0.309	0.307	−0.629	0.189
Life convenience	−0.156	0.214	−0.203	0.237	**0.844*****	0.208
Number of relatives & friends	−0.099	0.193	**0.539****	0.226	0.252	0.155
Spouse/parents work/live locally	**0.856*****	0.416	**0.530***	0.482	0.364	0.738
Length of residence	−0.429	0.266	−0.232	0.252	0.193	0.265
House-price perception						
Residential pressure	0.080	0.171	0.180	0.185	0.112	0.234
Psychological stress	0.114	0.210	**0.779*****	0.259	0.303	0.331
Satisfaction of the dwelling	**−0.610****	0.232	**−0.534****	0.290	−0.103	0.124
Living space	−0.158	0.177	0.114	0.214	0.213	0.139
Number of houses owned	**−0.847*****	0.393	**−0.486****	0.309	−0.420	0.451
Constant	1.735		−0.035		1.084	
−2 Log likelihood	267.584		210.173		75.473	
Pearson χ2	473.154		241.905		302.351	
Sig.	0.000		0.000		0.001	

Notes: * < 0.10, ** < 0.05, *** < 0.01 (two-tailed test), β refers to the regression coefficient, and SE refers to standard error

tention, indicating that the longer the working years, the lower the willingness to migrate. Longer years of employment in a city mean a more extensive social network and a more stable life, so migration intention declines over time (Garriga et al., 2021). Among the push factors, the degree of social integration influences the flow of talents ($\beta = -0.543$, $P < 0.05$), illustrating that those with a lower sense of social integration are more inclined to migrate. Hence, the roles of 'traditional thresholds', such as institutional inclusion and economic integration, are gradually blurred, while social integration becomes a significant 'booster'. Similar to ordinary workers, talents also require the perception of affiliation and a sense of belonging. Social integration is the psychological cognition and judgment formed by interactions of life, work, and other aspects (Huang, 2022). This study reveals that the purpose of talents is not only to earn money but also to find the 'meaning of life'.

Among the pull factors, expected income ($\beta = 0.421$, $P < 0.1$) positively correlates with migration intention, revealing that talents with higher expected income are more likely to migrate to destination cities. As a typical 'rational person', talents make the most use of their limited resources to maximize utility, so their migration is an essential investment in human capital. This is consistent with the evidence from Economic Co-operation and Development (OECD) countries that economic amenities significantly influence talent mobility (Cleave and Arku, 2020). Moreover, the most significant pull factor is spouse/parents working and living in the destination city ($\beta = 0.856$, $P < 0.01$), indicating that when making migration decisions and destination choices, talents often strike a balance between work and family.

In addition, among house-price perceptions, residential satisfaction is negatively correlated with migration intention ($\beta = -0.610$, $P < 0.05$), indicating that talents with higher residential satisfaction are inclined to stay in the current city. Thus, the impact of mental stress caused by exorbitant housing prices on mobility is more apparent than that of financial burden. High-level talents have relatively sophisticated needs (Zhu et al., 2021), and their focus has shifted from 'homeownership schemes' to 'a nice place to live' sort of consideration. As high housing prices increase, they have to pay more to maintain the existing living environment or accept the decline in their residential quality to save costs (Zhu et al., 2021). The number of houses owned

presents a compelling explanatory power for migration intention ($\beta = -0.847$, $P < 0.01$). According to the welfare accumulation effect (Taima and Asami, 2020), high housing prices can increase the asset value of talents who already own properties, thereby reducing their willingness to migrate.

4.1.2 Determinants of talent migration intention in medium house-price region

In medium house-price regions, among the personal factors, gender ($\beta = -0.761$, $P < 0.05$) and age ($\beta = -0.538$, $P < 0.10$) are related to migration intention. Among the pull factors, talent migration intention decreases with the wage level ($\beta = -0.604$, $P < 0.01$) and increases with the size of social networks ($\beta = 0.539$, $P < 0.05$) in the destination city. Economic interests, such as wages, employment opportunities and career advancement, are the most potent sources for attracting high-level talents. This study reveals that talent migration propensities weigh costs and benefits. Talents pursue better capitalization of human capital and initiate the process of 'cumulative causation' (Taima and Asami, 2020). Similar to high housing price regions, parents and spouses working in the locality significantly encourage the settlement intention of talents ($\beta = 0.530$, $P < 0.10$). This finding is consistent with the notion that Chinese people pay more attention to kinship and family concepts (Hu, 2016).

Furthermore, among house-price perceptions, psychological stress ($\beta = 0.779$, $P < 0.01$), satisfaction of the dwelling ($\beta = -0.534$, $P < 0.05$), and the number of houses owned ($\beta = -0.486$, $P < 0.05$) are the decisive factors for talent migration in medium house price regions. Therefore, housing prices are the 'brand-new challenge' of high-level talent migration. Previous studies also indicated that high urban housing prices would reduce migration probability, as they directly increase the cost of buying or renting a house (Taima and Asami, 2020). According to the welfare dissipation effect (Cleave and Arku, 2020), high housing prices can bring adverse effects, e.g., higher commodity prices and daily expenses, and living spending is inseparably associated with housing prices. Moreover, high housing prices indirectly influence the cost of living as the sale price of goods increases accordingly (Garriga et al., 2021). These factors bring residential pressure to own or rent a house and psychological stress that may cause anxiety and depression, which push talents out of the city.

4.1.3 Determinants of talent migration intention in low house-price region

However, the migration intention of talents in low house-price regions is affected by personal characteristics and pull factors. Among personal characteristics, female talents have lower migration intention ($\beta = -0.824$, $P < 0.01$). In China, women, especially unmarried young women, are more motivated to migrate for development and maximize family gains, such as employment outflows and distant marriages. Moreover, only the convenience of life impacts talent migration intention among the pull factors ($\beta = 0.844$, $P < 0.01$). It indicates that urban infrastructure and living conditions are vital for attracting talents in low house-price regions. Perfect public facilities, convenient transportation, good medical and health services, as well as educational facilities are the main concerns for talents in low house-price regions (Garriga et al., 2021). The results also suggest that there is still a big gap between the infrastructure and city-related services in this region and higher house-price regions, which becomes the main bottleneck to attracting talents in low house-price regions.

4.2 Destination selection analysis

As illustrated in Fig. 3, in high house-price regions, most talents with migration intentions preferred to move into low house-price regions. In medium house-price regions, more than half of high-level talents with migration intentions were willing to migrate to low house-price regions. Moreover, in low house-price regions, talents with migration intentions were more willing to move into high house-price regions. Detailed results and analyses are as follows:

Table 4 reveals that talents in high house-price regions are affected by multiple factors when making destination choices. Among the pull factors, wage ($\beta = -1.253$, $P < 0.05$) impacted the choice of destination. Talents pay close attention to the expected income and attach more importance to future development prospects and opportunities with more willingness to stay as 'futuristic' in the high house price region. In addition, the results confirm the agglomeration effect of rising housing prices on high-level talents. Hence, although high wages and convenient infrastructures can compensate for high housing prices, if housing prices cause unbearable psychological pressure, talents tend to migrate to less developed cities to seek a comfortable life-
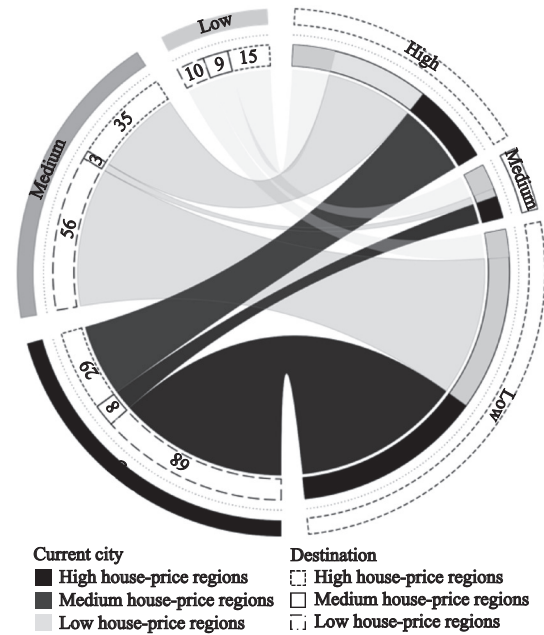

Fig. 3 Destination selection in each region of Pearl River Delta Megalopolis

style. This movement behavior is called 'converse migration' or 'counter-urbanization' (Taima and Asami, 2020). Psychological stress perceptions caused by housing prices significantly promote the migration of talents in this region ($\beta = -0.690$, $P < 0.1$; $\beta = -1.466$, $P < 0.10$). When talents feel the increasing perceived housing unaffordability, the adverse effects of housing prices appear. Chen et al. (2019) also provided strong evidence of a 'crowding out effect' on talents in first-tier cities due to unaffordable housing prices.

In medium house-price regions, talent destination selection is only affected by pull factors. Among pull factors, the reinforcing effect of wage ($\beta = -0.343$, $P < 0.10$) on destination selection is similar to high house-price regions. Most existing literature considers economic factors when exploring migration decisions (Wang et al., 2020; Gu, 2021). With the improvement of human capital endowment, the purpose of talents is to find a high-reward job. Economic factors, such as wages, are the core purpose for migrants to fully integrate and settle in cities (Chen and Liu, 2016). Moreover, the length of residence ($\beta = -1.109$, $P < 0.10$) can also influence talent destination selection. The length of residence is the process of individual subjective emotional cognition, which is also the process of 'resocialization' in a city (Xu et al., 2022). By establishing social attachment, high-level talents can better acquire resources em-

Table 4   Analysis results of destination selection in Pearl River Delta Megalopolis

Independent variables	High house-price regions		Medium house-price regions		Low house-priceregions	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Personal characteristics						
Gender	0.586	−1.337	0.001	−7.903	2.298	10.745
Age	0.395	**−3.065**[*]	0.192	−3.519	−3.306	−5.228
Marriage	−1.111	−0.645	−0.341	13.011	20.966	−1.398
Working years	**−1.647**^{**}	0.644	−0.234	−1.186	−22.696	4.066
The push factors						
Household registration	−0.608	−1.065	−0.143	1.855	6.705	−3.856
Economic integration	−0.496	−1.183	−0.293	−3.182	−5.493	−4.382
Social integration	−0.201	−0.883	−0.109	−8.300	−7.872	−7.312
Cultural integration	−0.678	−0.945	−0.273	−4.374	−6.492	−6.383
The pull factors						
Wage	**−1.253**^{**}	−0.736	**−0.343**[*]	4.352	3.470	−7.733
Expected income	−0.585	−0.472	0.131	−8.993	14.767	6.681
Life convenience	0.051	−0.611	−0.268	−3.454	−2.278	−16.624
Number of relatives and friends	0.429	−0.399	−0.038	1.215	−8.901	−13.395
Spouse/parents work and live locally	−0.703	−0.326	−0.142	1.880	23.249	−2.747
Length of residence	**−1.761**^{**}	−0.790	**−1.109**[*]	−19.158	−20.134	7.307
House-price perception						
Residential pressure	−0.464	−0.098	−0.102	−6.862	−23.758	−6.757
Psychological stress	**−0.690**[*]	**−1.466**[*]	−0.286	−6.725	−7.985	−0.210
Satisfaction of the dwelling	0.110	−0.441	0.105	11.343	−6.046	−0.198
Living space	−0.066	0.690	−0.108	−6.503	−19.605	−10.282
Number of houses owned	**1.906**^{**}	1.876	0.363	0.168	34.868	4.587
−2 Log likelihood	174.904		147.834		72.949	
Pearson χ^2	191.610		97.626		0.000	
Sig.	0.000		0.015		1.000	

Notes: reference to low housing price regions. Model 1: High housing price regions; Model 2: Medium housing price regions. [*]< 0.10, ^{**}< 0.05, ^{***}< 0.01 (two-tailed test), β refers to the regression coefficient, and SE refers to standard error

bedded in social networks. Therefore, the length of residence influences their destination selections.

5   Discussion

This study investigates the determinants of talent migration intention and explores the impact of housing prices, revealing a complex mechanism underlying migration decisions. Several theoretical contributions emanate from this research. Firstly, different from traditional approaches to population mobility, this study focuses on migration intentions and behaviors of high-level talents, which fills the knowledge gap on various determinants between ordinary labor and high-level talents. It is essential for formulating related policies for talent introduction and forming a new pattern of rational space docking, coordinated industrial development and effect-

ive allocation of human resources. Secondly, this study advances the knowledge in the field of push-pull theory by proposing variables that affect talent migration intention, which shows that talent migration is a consequence of comprehensive interactions. The results provide valuable inputs for decisions to avoid brain drain. Thirdly, by investigating regional differences in critical factors affecting talent mobility, this study provides a new perspective for population mobility research and sheds light on urban modernization for retaining and attracting talents in different economic development regions.

High-level talents are essential resources for economic and social development, which is of great significance to enhancing regional competitiveness (Taima and Asami, 2020). Based on the results of this study, the following practical implications are proposed. Firstly, the

results show that high-level talents are increasingly concerned about local amenities and non-economic benefits in choosing migration destinations. Therefore, a broad range of factors should be considered rather than solely focusing on economic growth when formulating urban development strategies (Garriga et al., 2021). Attaching importance to social adaptation challenges is crucial, as it can enhance migration intentions. For example, creating a harmonious neighborhood environment (e.g., via youth or community sporting events) can make it easier for high-level talents to integrate within their community and enhance their sense of belonging (Huang, 2022). Meanwhile, municipal human resources and social security departments are encouraged to help new talents adjust by enhancing their social capabilities.

Secondly, government agencies should formulate talent policies tailored to local conditions, that is, 'one city, one policy'. Specifically, areas with high and medium housing prices should pay more attention to formulating housing policies to attract and retain high-level talents, such as talent support programs and apartments, to reserve talents for economic innovation. Low house-price areas should establish a multi-level economic system, improve infrastructure construction to satisfy the needs of talent career development and reserve sufficient development space for long-term industrial upgrading. Moreover, based on urban and industrial advantages, government agencies should achieve coordinated regional development by integrating high-quality resources and guiding rational migration of heterogeneous high-level talents. It can not only attract and retain high-level talents but also stimulate their effective integration, thereby promoting regional economic development (Green and Hogarth, 2017).

Thirdly, some measures can be taken to restrict the negative impacts of house-price perceptions. On the one hand, housing policies should address the coordination of housing and labor supply based on expectations of higher housing appreciation (Galster and Lee, 2021). The existing housing assistance programs are typically set up to distribute housing subsidies to low-income households in metropolitan areas (Bieri and Dawkins, 2019). Policies should target enhancing purchase affordability by including talents into the scope through housing finance systems or housing tax credit programs. On the other hand, governments can retain talents through industrial agglomeration and upgrading. Measures include giving high-tech enterprises the right to apply for social security housing for talents according to their actual needs. Meanwhile, based on the perceived housing affordability index or housing stress index, authorities can develop a robust measurement system. It is possible to keep housing prices within a reasonable range to accommodate urban economic growth while avoiding the crowding-out effect on high-level talents.

However, this study still has some limitations that need to be further addressed by future studies. Firstly, although previous literature has suggested that intention can reflect individual behavior (Wang et al., 2020), it is a psychological concept that can not be fully equated with actual behavior. It will be interesting to explore the difference between the predictors of actual and intended migration. Secondly, migration decision-making is closely related to lifecycle and career advancement, suggesting that further research can capture the complexity of mobility decisions across the whole life course. It can extend the understanding of migration research. Moreover, future work in other national contexts with different economic and social policies can provide a greater understanding of how people choose their residential locations. The challenge that high-level talents outmigrate to new situations is another interesting topic.

6 Conclusions

Based on the questionnaire survey data from 503 high-level talents in the PRD megalopolis, this study adopts the push-pull theory and focuses on different house-price regions. Binary regression and multiple regression models are used to incorporate housing prices into high-level talent migration intentions and investigate the determinants of destination decisions. This study reveals the specific functions of personal characteristics, push factors, pull factors, and house-price perceptions in different regions. The results indicate that: 1) the migration intention and behavior of high-level talents have regional differences. 2) Social integration in high house-price regions is the primary push factor. With economic and social development, institutional restrictions have been gradually weakened and only exist in medium and low house-price regions. 3) Main factors for retaining talents in high house-price regions are the expectation of future work and intimate family relationships. The main factors that attract talents in medium house-price re-

gions are the current salary levels and intimate family relationships. Living convenience is a vital determinant that can retain talents in low house-price regions. 4) Psychological stress exists in higher house-price regions, and the desire of high-level talents for fine residence affects their migration intention infinitely.

Conflict of Interest

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Author Contributions

SHEN Chen: writing-original draft, formal analysis, methodology, data curation, writing-review & editing; WANG Yang: supervision, conceptualization, project administration, funding acquisition, writing-review & editing; ZUO Jian: supervision, writing-review & editing; Raufdeen RAMEEZDEEN: conceptualization, writing-review & editing.

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