

## Article

# Research on Sustainable Urban–Rural Integration Development: Measuring Levels, Influencing Factors, and Exploring Driving Mechanisms—Taking Eight Cities in the Greater Bay Area as Examples

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**Abstract:** Urban–rural integration is a top priority in social development and an urgent requirement for vigorously promoting rural revitalization. However, the current development of urban–rural integration in China still faces issues such as an unreasonable urban–rural industrial structure, unidirectional flow of rural population, and low sense of belonging among rural residents. Based on this, this paper selects eight cities from the Greater Bay Area as examples, organizing urban–rural integration development data from 1986 to 2022. It employs principal component analysis to quantitatively evaluate the evolutionary trend of urban–rural integration, constructs a fixed-effect panel quantile regression model to explore the factors influencing urban–rural integration and its spatiotemporal evolution, and uses threshold effects and interaction effects to test the threshold and application requirements for maximizing the benefits of urban–rural integration driving mechanisms, drawing empirical insights from comparisons with other bay areas around the world. The research found the following: First, between 1986 and 2022, the development of urban–rural integration in the Greater Bay Area steadily progressed, with gradually emerging effects, and industrial integration and population integration made significant contributions to the development of urban–rural integration. Second, the driving mechanisms of market economics, government intervention, and social fusion significantly impact urban–rural integration, with the influence of market economics being the most significant. Third, the impacts of the three driving mechanisms on urban–rural integration show temporal and spatial differences. In terms of time, market economics and government intervention always have a positive impact, while social fusion shows a “suppressing-promoting” trend, with a lower impact coefficient. Spatially, there are differences in strategies and priorities for promoting urban–rural integration in each region. Fourth, all three driving mechanisms exhibit threshold effects, and the explanatory power of any two interacting driving mechanisms for urban–rural integration development is stronger than that of any single mechanism. Notably, the combined interaction effect of the three driving mechanisms has the highest impact coefficient. The driving mechanisms should be implemented according to the principles of “synchronization, heterogeneity, and categorization”.

**Keywords:** urban–rural integration; sustainable rural development; influencing factors; driving mechanisms

## 1. Introduction

The integration of urban and rural development is fundamental to China's economic and social progress, forming the cornerstone of overall stability and representing the "last mile" in social governance. As China enters a new phase of development, the conditions for urban–rural integration have undergone profound transformations. Consequently, China has proposed accelerating the establishment and perfection of systems and policy frameworks for urban–rural integrated development [1]. To comprehensively advance rural revitalization, solidly promote common prosperity, and expedite modernization, the Chinese government is gradually advancing urban–rural integration, building a new pattern of joint construction, governance, and sharing.

Therefore, accelerating urban–rural integration is of significant importance and necessity. First, rural revitalization, a demand of both history and practice, primarily focuses on urban–rural integration [2]. For a long time, China has explored solutions to the unbalanced development caused by the urban–rural dual structure, deepening its understanding of the urban–rural relationship. Implementing the strategy of rural revitalization and promoting urban–rural integration are guiding principles in addressing the current issues of inadequate rural public infrastructure, irrational spatial planning, uneven distribution of urban–rural resources, and severe environmental pollution as well as resulting challenges like rural hollowing, aging, land abandonment, and decline. Secondly, China faces obstacles in its urban–rural integration work, making the process challenging. The advancement of reform and opening-up has gradually improved living standards and significantly adjusted the urban–rural industrial structure, laying a solid foundation for integration. However, significant disparities still exist between urban and rural residents in economic, living, and cultural aspects, with a widening trend. In terms of industrial integration, urban and rural industries in China have not formed complementary advantages, with weak structural complementarity and hindered factor mobility between urban and rural areas, impeding the emergence of new rural industrial paradigms and affecting sustainable development. In terms of population integration, migration mainly flows from rural to urban areas, without fully realizing the two-way movement of urbanizing rural populations and urban residents moving to rural areas. Hindered by the household registration system, rural residents cannot access public services on par with urban residents, suppressing their urbanization aspirations. Moreover, due to traditional disdain for rural areas in Chinese culture, urban-to-rural migration is less common. In terms of cultural and lifestyle integration, the widening income gap between urban and rural residents has left rural consumption growth far behind urban levels. Most rural residents still lack access to education, housing, social security, and medical services comparable to urban areas. The low degree of cultural and lifestyle integration between urban and rural areas also presents governance challenges, as the influx of rural populations into cities increases the complexity and heterogeneity of governance subjects, destabilizing social stability. Thus, how to fully integrate rural populations into urban social and cultural life and enhance their sense of belonging is a key aspect of advancing urban–rural integration in China.

Therefore, it is necessary to select cases with strong experience and generalizability to explore the level, spatial-temporal evolution, and driving mechanisms of urban–rural integration. The Greater Bay Area, one of the world's most economically vibrant urban agglomerations, is designated as a comprehensive reform and development pilot zone for urban and rural integration in China, making its development worthy of attention. Rural statistics are also not available for Hong Kong, Macao, and Shenzhen because the Chinese government does not have rural household registration in these areas due to their high degree of urbanization. This paper explores the level of urban–rural integration and development, and the removal of non-farming areas will not have an impact on the results of the paper. This study primarily focuses on the other eight major cities (Guangzhou, Foshan, Dongguan, Huizhou, Zhuhai, Jiangmen, Zhongshan, and Zhaoqing) of the Greater Bay Area. This approach aims to reflect the overall situation of urban–rural integration in the area; analyze its influencing factors and spatial-temporal trends; explore

the driving mechanisms of urban–rural integration and its subsystems such as industrial, population, and cultural life integration; and examine the threshold and interaction effects of urban–rural integration in the Greater Bay Area. Given the scarcity of micro- and meso-level research in the current academic discourse on urban–rural integration, which primarily focuses on conceptual and theoretical studies without establishing a unified, mature theoretical framework, and a notable lack of quantitative research on spatiotemporal evolution and panel data leading to insufficient explanatory power for the driving mechanisms of urban–rural integration, this paper contributes by selecting the Greater Bay Area, known for its pronounced urban–rural disparities. It aims to analyze the influencing factors and spatiotemporal evolutionary trends of urban–rural integration using three driving mechanisms: market economy, government intervention, and social fusion. Utilizing various quantitative models, including fixed-effect models and threshold testing, and adopting a comparative perspective, this study seeks insights from the urban–rural integration processes of other global bay areas. In conclusion, this research aims to provide new insights for urban–rural integrated development worldwide, effectively responding to the urgent needs of coordinated urban–rural development and rural sustainability.

## 2. Literature Review: Urban–Rural Integration

### 2.1. Concepts and Methods

Regarding the question “What is urban–rural integration?”, academia has not provided a unified answer. Urban–rural integration refers to the process of leveraging the unified effects of industry to drive integrated development in urban and rural areas as well as in industry and agriculture [3]. It aims to promote organic integration between urban and rural areas, break down barriers, improve the living and working conditions of residents, and ensure the mutual flow of urban and rural resources and elements [4]. However, this process should emphasize the coordination between urban ecological civilization and rural ecological scenery [5] as well as promote the free and comprehensive development of people [6], allowing both urban and rural residents to thrive in their respective environments [7]. Thus, urban–rural integration should be viewed as a complex system encompassing economic, social, cultural, population, resource, and ecological factors [8]. In terms of conceptual quantification, the classic five level-evaluation indicators are politics, economy, culture, society, and ecology [9]. With ongoing urbanization, scholars have noted the need to include spatial integration in the evaluation system of urban–rural integration [10] as well as the dimensions of integration in living, medical, and educational services [11]. Some scholars have also recognized the issue of environmental degradation, suggesting that the integration of urban and rural ecological environments should be an important evaluation criterion [12].

In terms of econometric models, the academic community commonly uses methods like principal component analysis (PCA) [13], factor analysis [14], hierarchical cluster analysis [15], and UAR models [16]. Eastwood employed a correlation regression model to analyze the reasons behind agriculture lagging behind industry and the tertiary sector, identifying agricultural productivity as a key factor [17]. Mazlan Bin Che Soh analyzed the interrelationship between urban–rural integration and crime through a theoretical framework of social stability [18]. Samples from Canada were selected to analyze the impact of urban–rural development on residents’ rights and well-being [19]. H. Taubenbock utilized remote sensing data systems to find that with the acceleration of urban–rural integration, significant changes occur in the spatial dimensions of cities [20].

### 2.2. Influencing Factors and Driving Mechanisms

Academia considers urban–rural integration a complex system process influenced by various factors, requiring multiple driving forces to achieve unification. The interaction between urban “agglomeration economies” and rural industrialization is a key driving factor [21], with aggregation diffusion and market interaction being central to urban–rural integration [22]. Additionally, it is important to leverage the radiating influence of core

cities and enhance the feedback capacity of rural areas [23]. Urban–rural efforts should focus on both fronts: using urban organizational systems as breakthrough points [24], improving rural transportation infrastructure [25], accelerating the urbanization of rural residents, enhancing the quality of rural life, promoting rural revitalization [26], and fostering effective integration of primary, secondary, and tertiary industries in urban and rural areas [27]. However, the most crucial aspect is to construct a people-centered social security system [28], allowing rural populations to develop a sense of belonging and identity in urban areas. Practice shows that factors like land, population, and capital are important in influencing urban–rural development [29]. Urban–rural integration encompasses the complex process of social governance, representing not just the equalization of urban and rural areas but also the multifaceted integration of urban–rural spaces. Hence, social factors positively influence the harmonious development of the urban–rural relationship and help maintain the stability of integration [30]. In recent years, China has placed greater emphasis on urban–rural integration, continuously adjusting related institutional arrangements and gradually launching pilot demonstration projects [31]. The government plays a key role in guiding and regulating urban–rural integration, using policies and fiscal spending to narrow the urban–rural development gap and promote the bidirectional flow of talent and resources, thereby achieving the integration of “people, land, and resources” [32]. Meanwhile, the market, as a major driving force of urban–rural integration, activates the vitality of urban–rural elements and market entities through resource allocation and capital flow, unleashing the energy of traditional and new productive forces and directly empowering the process of integration [33].

Based on this, the market economy, government intervention, and social fusion each play a unique role in urban–rural integration, with the market as the economic engine being the most critical factor. Therefore, the following hypothesis is proposed:

**Hypothesis 1:** *The market economy, government intervention, and social fusion significantly impact urban–rural integration, with the market economy being the most critical influencing factor.*

The effectiveness of the market economy, government intervention, and social fusion depends on certain conditions, and their impact on urban–rural integration becomes significant only when they reach a certain level. Generally, the market economy mechanism, when achieving a scale effect, and stronger market allocation capability, is more conducive to achieving positive urban–rural integration [34]. A shift in government intervention focusing more on balanced development is also more favorable for positive urban–rural integration [35]. The social fusion mechanism, when reaching a certain critical point or harmonious joint development, is beneficial for urban–rural integration [36]. In other words, the impact of the market economy, government intervention, and social fusion on urban–rural integration exhibits a threshold effect. Based on this, the following hypothesis is proposed:

**Hypothesis 2:** *There exists a threshold effect in the impact of the market economy, government intervention, and social fusion on urban–rural integration.*

Effectively utilizing the mechanisms of market economy, government intervention, and social fusion is key to maximizing the benefits of urban–rural integration. The market mechanism is fundamental to promoting optimal resource allocation and driving innovation, effectively permeating all aspects of urban–rural integration [37]. However, the market can also lead to problems like resource over-concentration and social inequality [38], necessitating appropriate government intervention. The government plays an irreplaceable role in urban–rural integration by planning development and adjusting market failures [39]. The mechanism of social fusion, particularly the roles of transportation, culture, education, and social organizations, is equally important in shaping local identities, fostering social capital, and enhancing civic participation [40]. Comprehensive analysis suggests that when the mechanisms of market economy, government intervention, and social fusion are organi-

cally combined, they can produce a synergistic effect, promoting the comprehensiveness and sustainability of urban–rural integration and thus maximizing its benefits. Based on this, the following hypothesis is proposed:

**Hypothesis 3:** *The combined use of market economy, government intervention, and social fusion mechanisms will yield the greatest benefits for the development of urban–rural integration.*

### 2.3. Development Patterns and Spatiotemporal Evolution

There are four main models of urban–rural integration development in China. The Pearl River Delta region, with its rapid urbanization, has formed a new pattern of urban–rural integration, characterized by villages within cities. The Shanghai model primarily involves public sector facilitation of urban–rural cooperation, achieving complementary advantages and coordinated governance. The Beijing model focuses on industrial–agricultural cooperation, combining urban and rural areas by connecting them in the secondary sector. This allows the flow of advanced urban elements into rural areas, driving the rural economy and sharing profits and risks. The Southern Jiangsu (Su-Nan) area leverages township enterprises and industrial integration as a lever to coordinate the development of industry, agriculture, and commerce in the region.

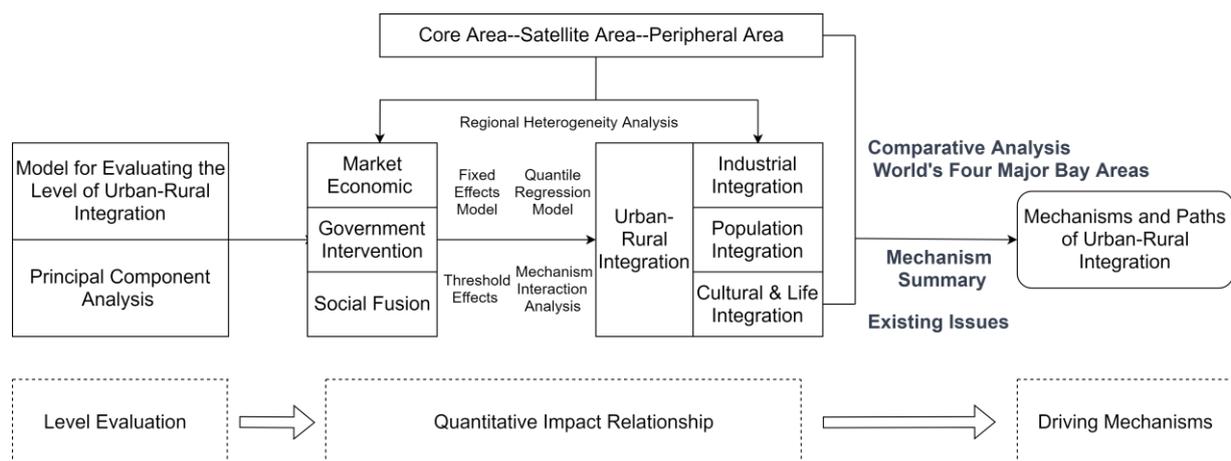
In the course of his research on China’s Greater Bay Area, T.G. McGee discovered that, as urbanization progresses, the geographical boundaries between urban and rural areas increasingly blur, giving rise to a unique territorial organization where agriculture and non-agriculture coexist, trending towards urban–rural integration—termed “Desakota”. This territorial system is a complex and composite regional system encompassing core areas, peripheral areas, and satellite areas [41]. The core area refers to the central hub of regional development, typically characterized by the most advanced economy, the densest population, the most cutting-edge technology and facilities as well as the most comprehensive services and infrastructure. Satellite areas are smaller cities that develop around the core area, possessing a certain level of economic and social development but largely dependent on the economic radiation and resource support from the core area. The peripheral area denotes relatively backward regions, usually situated on the outskirts where urbanization is slower and where economic activities, infrastructure, and service levels are lower. In the Greater Bay Area, the core and satellite areas indeed form a complementary relationship in resource advantages and integrated development. However, the peripheral areas are isolated from the integrated framework, unable to fundamentally change their impoverished and backward conditions. Therefore, to narrow the widening urban–rural divide and move towards urban–rural integration, it necessitates rational utilization of government intervention and market tools. Since different regions exhibit different contradictions, it is imperative to accurately identify and address the specific contradictions of different areas rather than applying a one-size-fits-all approach to effectively promote urban–rural integration.

Market economy, government intervention, and social fusion dynamically impact urban–rural integration, exhibiting different characteristics over time and across regions. Over time, the role of the market economy changes; initially, it drives the flow of rural labor to cities but later exacerbates the imbalance in urban–rural development [42]. In such cases, government intervention is needed for adjustment. The government’s role evolves with the urbanization process, shifting from attracting investment and promoting urban development to coordinating urban–rural relationships, bridging development gaps, and providing public services [43]. Social and cultural changes also influence the process of urban–rural integration [44]. Spatially, market forces in developed areas are stronger and attract more resources, while less developed areas may face the challenges of market underdevelopment [45]. Correspondingly, government roles and policies vary across regions, often tailored to local characteristics and needs [46]. Likewise, the influence of social factors varies across regions, affecting the diversity and sustainability of urban–rural integration [47]. Based on this, this paper proposes the following assumptions:

**Hypothesis 4:** *The influence of the market economy, government intervention, and social fusion on urban–rural integration exhibits temporal and spatial variability.*

Despite extensive research in the field, there remain limitations such as a continued premise of urban–rural opposition, a focus on developing countries with limited micro-level studies, a lack of quantitative research using time series and panel data, and no unified theoretical framework with sufficient explanatory power for the driving mechanisms.

Based on this, the paper innovates in two main aspects. In terms of research content, this paper proposes for the first time an explanatory framework for industrial integration, population integration, and culture life integration. It attempts to apply the four driving factors of market economy, government intervention, and social fusion, along with their interactive effects, to elucidate the influencing factors of urban–rural integration development in the eight cities of the Greater Bay Area. The approach involves estimating the region’s urban–rural integration evolution trends over time and by area. As for research methods, the current academic analysis tends to be monolithic, with a relative lack of empirical analysis. Therefore, this paper employs quantitative research methods such as fixed-effects quantile regression, threshold effect testing, and analysis of variance using panel data, complemented by qualitative methods including analysis of local policy documents and comparative analysis with other bay areas around the world. This comprehensive approach addresses the current research gap in urban–rural integration. Figure 1 presents the research framework.



**Figure 1.** Research Framework.

### 3. Methodology

#### 3.1. Data Source and Indicator Construction

In order to explore the level of urban–rural integration of the eight cities in the Greater Bay Area, to summarize the interrelationships among industrial integration, population integration, and cultural life integration and to explore the spatial and temporal evolution characteristics and driving factors of urban–rural integration in the Greater Bay Area, we carried out the following: Firstly, the data from Guangdong Statistical Yearbook, Guangdong Rural Statistical Yearbook, and the statistical yearbooks of eight cities were utilized and subjected to principal component analysis. Second, we measured and studied the level of urban–rural integration and its evolutionary characteristics in the Greater Bay Area year by year from 1986–2022, derived the urban–rural integration development index and its subsystem index, and analyzed their trends. Finally, based on the progress of China’s urban–rural integration index research, an urban–rural integration evaluation index system was constructed (Table 1).

**Table 1.** Urban–rural integration evaluation index system.

Subsystems	Norm	Unit (of Measure)	Alert Value	Target Value	Causality
Industrial Integration	A1 Value added of tertiary sector as a share of GDP	%	/	≥50	+
	A2 Agricultural labor productivity	RMB per capita	/	≥6.5	+
	A3 Primary sector value added as a share of GNP	%	<0.15	<0.05	–
	A4 Ratio of social retail sales per capita in urban and rural areas	%	5	2	–
	A5 Share of value added of secondary and tertiary industries in GDP	%	/	95	+
Population Integration	B1 Share of urban population	%	/	≥65	+
	B2 Share of primary sector employment in total employment	%	<0.30	<0.15	–
	B3 Urban and rural high school enrollment rate	%	/	90	+
	B4 Natural population growth rate	%	<7	<5	–
	B5 Share of non-farm workers	%	/	80	+
Culture Life Integration	C1 Engel’s coefficient ratio for urban and rural residents	%	1	0.68	–
	C2 Number of practicing physicians per 1000 population	person	/	≥3	+
	C3 Number of full-time teachers per 10,000 students enrolled in primary education in urban and rural areas	person	/	2000	+
	C4 criminal case filing rate per 10,000 people	Item	60	30	–
	C5 freeway density	kilometers per hundred square kilometers	/	8.6	+
	C6 Ratio of housing floor space per capita in urban and rural areas	M <sup>2</sup> /%	0.8	1	–

Note: The slash symbol (/) denotes the absence or non-applicability of data, the plus sign (+) indicates positive indicators, and the hyphen (-) signifies negative indicators.

Secondly, based on the measurement results of the comprehensive index of urban–rural integration development mentioned above, this paper reconstructs the index system of driving factors (Table 1). Using a fixed-effect panel data model, it explores the driving factors of urban–rural integration development. Additionally, this study employed a panel quantile regression model with fixed effects to analyze the annual changes in urban–rural integration development in the Greater Bay Area, summarizing the evolutionary characteristics over time. The paper also categorizes the Greater Bay Area into three types of regions according to the level of urban–rural integration development: core areas (Guangzhou, Foshan, and Dongguan), satellite areas (Huizhou, Zhuhai, and Zhongshan), and peripheral areas (Jiangmen and Zhaoqing). It analyzes the differences in the driving factors of urban–rural integration development in different areas and summarizes the spatial development characteristics of urban–rural integration in the Greater Bay Area.

Finally, the paper analyzes the threshold effects and interaction terms of the driving factors, exploring the thresholds of the driving mechanisms and the impact of different combinations of driving mechanisms on urban–rural integration. This analysis will provide references for policy formulation.

### 3.2. Variable Measurement

Urban–rural integration is the result of the combined effects of market development, regional policies, social development, and other factors. Through the literature review, this paper identifies the core explanatory variables for urban–rural integration from three dimensions: market economy, government intervention, and social fusion, using 15 indicators to analyze the driving factors of urban–rural integration.

### (1) Dependent variable

The comprehensive development index of urban–rural integration, measured according to the evaluation indicator system in Table 2.

**Table 2.** Drivers of urban–rural integration.

Factor	Measurement Indicators	Formula
Market Economy Mechanism	X1 Level of economic development	GDP per capita = GDP/total population
	X2 Industrial institutional optimization	High industrialization = tertiary output/secondary output
	X3 Comparative labor productivity	Binary comparison coefficient = labor productivity in primary industry/comparative labor productivity in secondary and tertiary industries
	X4 Investment effectiveness	Investment in fixed assets per capita = total investment in fixed assets/average resident population
	X5 Level of openness to the outside world	Degree of openness to the outside world = total regional imports and exports/regional GDP
Government Intervention Mechanisms	X6 Equalization of public services	Public service construction = public service expenditure/regional fiscal expenditure
	X7 Population urbanization rate	Urbanization rate = urban population/total population
	X8 Level of land urbanization	Land utilization rate = built-up area/total land area
	X9 Agricultural support	Share of fiscal expenditure on agriculture, forestry and water = agricultural expenditure/fiscal expenditure
	X10 Employment structure optimization	Share of non-farm workers = secondary and tertiary employment/total employment
Social Fusion Mechanisms	X11 Expenditures on culture, education and recreation of the population	Ratio of rural–urban expenditure on culture, education, and recreation = urban residents' expenditure on culture, education, and recreation/rural residents' expenditure on culture, education, and recreation
	X12 Engel's coefficient	Ratio of rural–urban Engel's coefficient = Engel's coefficient for urban residents/Engel's coefficient for rural residents
	X13 Social retail sales per capita	Ratio of social retail sales per capita in urban and rural areas = social retail sales per capita in urban areas/social retail sales per capita in rural areas
	X14 Transportation accessibility	Density of road network = total length of roads/area
	X15 Disposable income per capita	Ratio of disposable income per capita of urban and rural residents = disposable income per capita of urban residents/disposable income per capita of rural residents
Control variable	C1 Capital flows	Capital flow efficiency = investment in social fixed assets/gross regional product
	C2 Labor mobility	Labor mobility ratio = ratio of employment in the three major industries/total population
	C3 Local fiscal expenditures	Local fiscal expenditure ratio = local fiscal expenditure/GDP
	C4 Science and technology inputs	Science and technology investment intensity = fiscal expenditure on science and technology/total fiscal expenditure

### (2) Core explanatory variables

**Market Economy:** Economic growth, improved investment environment, and optimized industrial structure can attract investment, playing a decisive role in resource allocation and strengthening urban–rural element flow to promote integration. Indicators such as per capita GDP, industrial sophistication, and the dual contrast coefficient [48], per capita fixed-asset investment, and degree of openness [49] are used to measure economic development level (X1), industrial structure optimization (X2), comparative labor productivity (X3), investment effectiveness (X4), and degree of openness (X5);

**Government Intervention:** Government guidance mechanisms have a promotive effect on urban–rural integration. Policies such as new urbanization and rural revitalization can fully exploit the city's leading role on rural areas. Local fiscal expenditure and funding

tendencies directly influence the development of specific areas such as land transfer, agricultural funding security, industrial policies, and public service investment. Public service expenditure ratio, urban population proportion, land utilization rate [50], fiscal expenditure ratio on agriculture, forestry and water affairs, and non-agricultural employment ratio [51] are used to measure public service equalization (X6), urbanization rate of the population (X7), land urbanization level (X8), agricultural support (X9), and employment structure optimization (X10);

Social Fusion: Urban–rural trade exchanges, upgraded consumption levels, and improved transportation can accelerate urban–rural connectivity and resource sharing, thereby enhancing the closeness of urban–rural interactions and the identification between urban and rural residents. The narrowing income gap between urban and rural residents reflects an improvement in rural living standards and an equalization trend of urban and rural welfare levels. The advantages of urban areas, such as market potential, wage levels, and convenient transportation, drive the transfer of surplus rural labor to cities and promote urban–rural integration in all aspects of social life through capital backflow and socio-cultural spillover to rural areas. Indicators such as urban–rural expenditure ratio on culture, education, and entertainment and the urban–rural Engel coefficient ratio [52], urban–rural per capita social retail sales ratio, road network density, and urban–rural per capita disposable income ratio [53] are used to represent residents' expenditure on culture, education, and entertainment (X11) as well as Engel coefficient (X12), per capita social retail sales (X13), transportation accessibility (X14), and per capita disposable income (X15);

### (3) Control variables

Based on existing the literature and empirical facts, the following control variables were selected: capital mobility, measured by the ratio of social fixed-asset investment to regional GDP; labor mobility, measured by the ratio of employment in the three major industries to the total population; local fiscal expenditure, measured by the ratio of local fiscal expenditure to GDP; and scientific and technological input, measured by the ratio of fiscal expenditure on science and technology to total fiscal expenditure.

### 3.3. Calculation Methods and Data Processing

#### 3.3.1. Principal Component Analysis

First, the raw data were standardized, and principal component analysis was performed to derive the number of common factors, and then, the factors, subsystems, and composite scores were calculated by linear weighted summation based on the cumulative contribution rate and factor score matrix.

In the above indicator system, the attribute “+” means a positive indicator, and the attribute “−” means a negative indicator. In order to eliminate the influence of different scales between indicators, the score was calculated according to Formula (1) for positive indicators and Formula (2) for negative indicators [54]. ( $G_i$ : score of indicator  $i$ ;  $O_i$ : actual value of indicator  $i$ ;  $T_i$ : target value;  $L_i$ : warning value. The total score of the indicator value of the evaluation system is 1).

$$G_i = \begin{cases} 1(O_i \geq T_i) \\ \frac{O_i}{T_i}(O_i \leq T_i) \end{cases} \quad (1)$$

$$G_i = \begin{cases} 0(L_i \leq O_i) \\ 1 - \frac{O_i - T_i}{L_i - T_i} (T_i \leq O_i \leq L_i) \\ 1(O_i \leq T_i) \end{cases} \quad (2)$$

The data after standardized treatment were subjected to principal component analysis, and the percentage of variance of each common factor and its cumulative contribution rate were obtained from the table of variance interpretation, and the cumulative contribution rate of the first three common factors was 87.064%, so they were used for the calculation of factor scores.

The score of each indicator in each common factor can be obtained from the matrix of component score coefficients. Based on this, the score of each public factor in previous years can be calculated first, and then, the ratio of the variance contribution rate of each public factor to the cumulative contribution rate as the weight, i.e.,  $a_k$ , to construct the comprehensive evaluation index of urban–rural integration development level and calculate the comprehensive score in previous years. The formula is as follows:

$$S_i = \varphi_{i1}X_1 + \varphi_{i2}X_2 + \dots + \varphi_{ip}X_p, i = 1, 2, 3, \dots, n \quad (3)$$

$$S = a_1S_1 + a_2S_2 + a_3S_3 + \dots + a_nS_n \quad (4)$$

In order to further analyze the trend of the index change of the subsystems over the years, it was necessary to calculate the score of each subsystem. First, we calculated the score of each factor in the subsystem on the common factor, added up each common factor score, and then used the ratio of the variance contribution rate and cumulative contribution rate of each common factor as the weight, i.e.,  $a_k$ , to construct the integration index of each subsystem. The formula is as follows.

$$S'_i = \varphi'_{i1}X_1 + \varphi'_{i2}X_2 + \dots + \varphi'_{ip}X_p, i = 1, 2, 3, \dots, n \quad (5)$$

$$S' = a_1S'_1 + a_2S'_2 + a_3S'_3 + \dots + a_nS'_n \quad (6)$$

### 3.3.2. Panel Quantile Regression Model with Fixed Effects

In conducting regression analysis, the ordinary least squares (OLS) method typically used is a mean regression, which can struggle to reveal the distribution differences of the dependent variable  $Y$  across various levels, only reflecting the mean level of  $Y$ . Furthermore, traditional regression models require the error term to meet certain assumptions: zero mean, homoscedasticity (constant variance), and normal distribution. These conditions are often hard to achieve in reality, which can significantly compromise the reliability of parameter estimates. However, quantile regression effectively addresses these shortcomings. Quantile regression does not make specific assumptions about the error term, thereby offering a broader scope of description and more reliable parameter estimates. It can reveal the evolutionary trends of variables over time. To better examine the impact of various explanatory variables on the comprehensive level of urban–rural integration development, this paper adopts a fixed-effect panel quantile regression model for the regression analysis:

$$Q_{Uri_{it}}(\tau X_{it}) = \alpha_i + x \beta_\tau, i = 1, 2, \dots, n; t = 1, 2, \dots, T \quad (7)$$

In the model,  $X_{it}$  and  $Uri_{it}$  represent the observed values of the explanatory variables ( $Eco_{it}$ ,  $Gov_{it}$ ,  $Sco_{it}$ ) and dependent variables, respectively, for the  $i$  cross-section at time period  $t$ .  $\alpha_i$  represents the fixed effects,  $\tau$  represents different quantiles, and  $\beta_\tau$  is the regression coefficient that quantifies the impact of the explanatory variables on the dependent variable at the  $\tau$  quantile. Based on the aforementioned panel quantile regression model, the constructed model in this paper is as follows:

$$Uri_{it,q} = \alpha_{i,q} + \beta_{1,q}Eco_{it,q} + \beta_{2,q}Eco_{it,q} + \beta_{3,q}Eco_{it,q} + \beta_{4,q}Eco_{it,q} + \beta_{5,q}Eco_{it,q} \dots + \beta_{n,q}Eco_{it,q} + U_{it,q}, i = 1, 2, \dots, n; t = 1, 2, \dots, T \quad (8)$$

In the formula,  $i$ ,  $t$ , and  $q$  represent the city, year, and quantile, respectively.  $\alpha$  and  $U$  represent the fixed effects and the residual term, respectively.  $\beta_\tau$  is the regression coefficient at the  $\tau$  quantile, indicating the impact of each indicator on the comprehensive level of urban–rural integration development.  $Uri$  represents the comprehensive index of urban–rural integration development,  $Eco$  represents the market economy,  $Gov$  denotes government intervention, and  $Sco$  stands for social fusion. The equation, using the market economy  $Eco$  as an example, is as above.

### 3.3.3. Threshold Effect Model

The fixed-effects model (FEM) is a popular statistical method in the field of econometrics for analyzing panel data or longitudinal data. It can address the issue of differences between individuals and provide a more accurate interpretation of results [55]. Fixed-effects modeling can help us better analyze longitudinal data, which is important for research and policy designation [56]. To analyze the nonlinear impact effect between urban–rural integration development and its influencing factors, this paper constructs a panel threshold regression model using market economy, government intervention, and social fusion as threshold variables.

$$Uri_{i,t} = \alpha_i + \varphi_1 Eco_{i,t} I(Eco_{i,t} \leq \gamma_1) + \varphi_2 Eco_{i,t} I(\gamma_1 < Eco_{i,t} \leq \gamma_2) + \dots + \varphi_n Eco_{i,t} I(Eco_{i,t} > \gamma_n) + \delta_m C_{i,t} + \varepsilon_{i,t} \quad (9)$$

where  $i$  and  $t$  denote city and year, respectively;  $I(\cdot)$  is the indicative function; i.e., if the expression in the parentheses is true, it takes the value of 1, and vice versa, it takes the value of 0; the threshold variables  $Eco_{i,t}$  and  $Govi_{i,t}$  and  $Scoi_{i,t}$  represent the level of the market economy, the degree of government intervention, and the level of social intermingling, respectively;  $\gamma_1 \sim \gamma_n$  are the thresholds to be estimated;  $\varphi_1 \sim \varphi_n$  are the coefficients of impacts of the explanatory variables for the different intervals;  $n$  depends on the number of the threshold variables, and  $\delta_m$  is the parameter to be estimated for each control variable;  $\varepsilon_{i,t}$  is the random disturbance term. The formulas are based on the example of a market economy  $Eco$ .

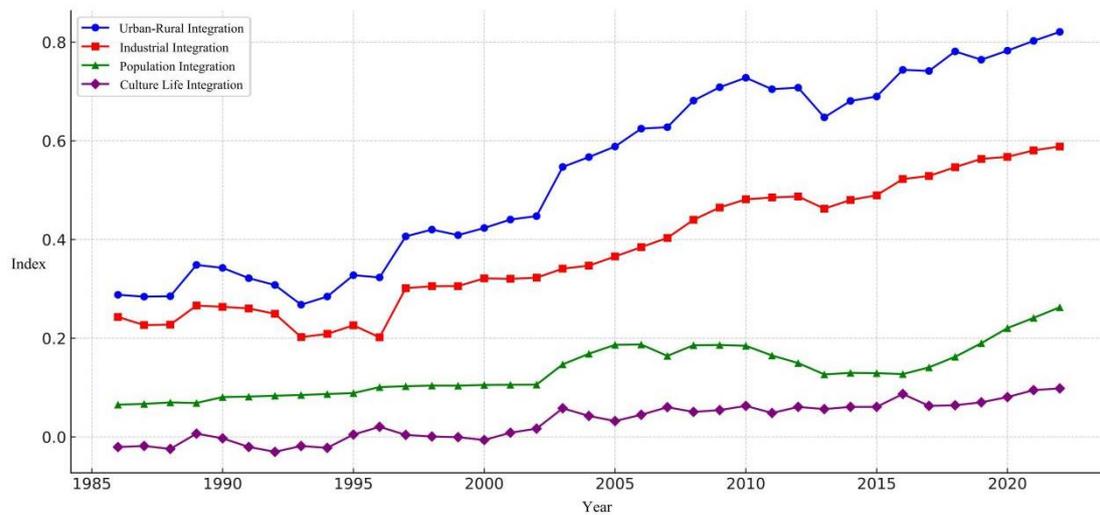
## 4. Empirical Results Analysis

### 4.1. Evaluation of Urban–Rural Integration Development Level

The level of urban–rural integration in the Greater Bay Area has increased from 0.32 in 1986 to 0.82 in 2022, marking an increase of 156.25 percentage points over 36 years (as shown in Figure 2). Specifically, the level of industrial integration in the Greater Bay Area started high and developed rapidly, with an index growth rate of 146% from 1986 to 2022. Over these 36 years, the area maintained a reasonable proportion in agricultural industry, and urban and rural retail goods could meet the demands of both urban and rural residents. However, the decline in the output of the primary industry did not lead to a decrease in the proportion of agricultural employment, so the current rural labor productivity remains far lower than that of urban areas. Secondly, the level of population integration started low and developed steadily, positioned between industrial integration and cultural life integration. From 1986 to 2022, its index growth rate was 305%. Yet, the current decline in the proportion of agricultural output in the Greater Bay Area has not led to a qualitative change in employment structure or a complete transfer of rural labor, which may indicate the presence of hidden unemployment. Additionally, due to the insufficient capacity of small- and medium-sized towns to absorb and gather population, urbanization growth is slow, increasing the difficulty of urban infrastructure construction and basic public service provision. Finally, the level of cultural life integration started with a negative index, remained low, and grew slowly, with an increase rate of 566% from 1986 to 2022. Field surveys indicate significant differences in urban and rural consumption structures in the Greater Bay Area, with a substantial gap in public security levels and a higher incidence of criminal cases in urban–rural junctions. The current level of basic public service equalization between urban and rural areas lags behind, with significant differences in lifestyle, consumption awareness, and habits between urban and rural residents.

In terms of development trends, the curve of urban–rural integration aligns closely with that of industrial integration, showing similar development and fluctuation trends leading to a preliminary conclusion that industrial integration contributes significantly to urban–rural integration. The curve of population integration showed little change in the early stages and fluctuated in the later period, suggesting it is in a period of institutional reform. The current trend of the population integration curve is synchronized with the changes in urban–rural and industrial integration curves, indicating that the driving role of population integration is gradually emerging postreform. The curve of cultural life

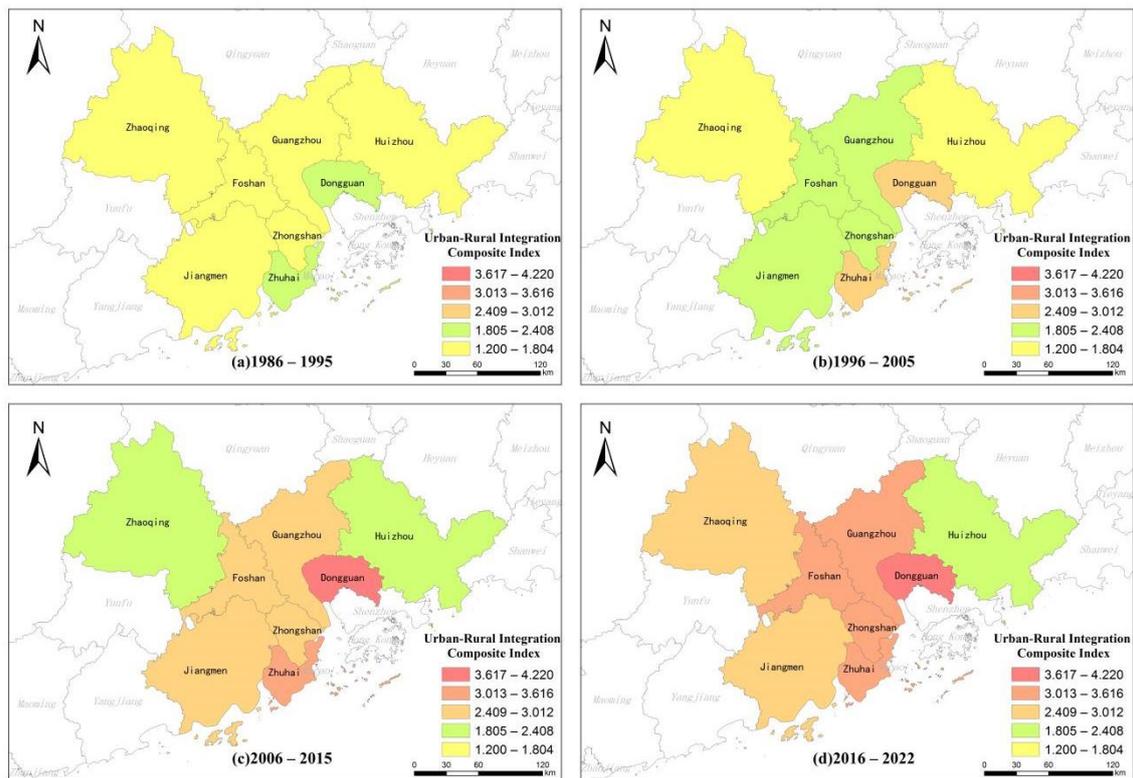
integration has consistently maintained a gentle, low-level trend and has not yet unleashed its driving force for the development of urban–rural integration.



**Figure 2.** Schematic of the time-ordered changes in the level of urban–rural integration and development, 1986–2022.

The data from Figure 3 illustrate the changes in the urban–rural integration composite index within the Greater Bay Area across four distinct time periods (1986–1995, 1996–2005, 2006–2015, and 2016–2022). From 1986 to 2022, there was an overall enhancement in the urban–rural integration composite index across the cities within the Greater Bay Area. Dongguan, in particular, exhibited the highest index and the most rapid development during the 2016–2022 period, likely linked to its dominant position in the manufacturing sector and export-oriented economy. Dongguan’s development strategy, possibly focused on industrial upgrading and innovation-driven growth, significantly propelled the fast-paced urban–rural integration. During the 2016–2022 period, Dongguan, Zhuhai, and Guangzhou reported the highest indices of urban–rural integration, benefiting from a robust economic foundation, well-established infrastructure, strong policy support, and successful urban planning. In contrast, Huizhou and Zhaoqing consistently displayed lower indices throughout all periods, indicating a lag in urban–rural integration processes attributed to a weaker economic base, a monolithic industrial structure, and insufficient attractiveness to talent.

Upon conducting a more detailed regional segmentation of the Greater Bay Area into core areas (Guangzhou, Foshan, and Dongguan), satellite areas (Huizhou, Zhuhai, and Zhongshan), and peripheral areas (Jiangmen and Zhaoqing), analysis of Figure 3’s data revealed several insights. Firstly, the core area consistently demonstrated a higher baseline and rapid development momentum in urban–rural integration across all stages. Despite fluctuations in integration levels around 2000 and 2008 due to the macroeconomic environmental volatility, the overall trend in the core area was one of stable growth. Secondly, the satellite area’s level of urban–rural integration, initially positioned between the core and peripheral areas, experienced significant volatility from 1988 to 2002. The year 2003 marked a turning point for the satellite area, which thereafter found a development path that suited its characteristics, leading to a steady increase in urban–rural integration levels. However, a considerable gap remains between the satellite and core areas. Thirdly, the peripheral area started with the lowest level of urban–rural integration, encountering frequent fluctuations throughout its development. Until 2005, the integration levels between the peripheral and satellite areas alternated. From 2006 onwards, the gap between the peripheral and satellite areas gradually widened. Yet, after 2014, the peripheral area began to narrow the gap with the satellite area, and the rate of growth stabilized. Despite this, significant differences in the level of urban–rural integration persist between the peripheral and satellite areas.



**Figure 3.** Schematic Diagram of the Spatiotemporal Evolution of Urban–Rural Integration by Region, 1986–2022.

#### 4.2. Baseline Regression and Quantile Regression

This paper employs Stata 15.0 software to perform mixed-effects, fixed-effects, and random-effects regression on the equation. F-test, Breusch–Pagan (BP) test, and Hausman test statistics were obtained, all passing the tests at the 1% significance level. Therefore, the fixed-effects model was chosen for the final analysis. The descriptive statistics for the main variables are presented in Table 3.

**Table 3.** Descriptive statistics of the variable data.

Variant	Sample Size	Minimum Values	Maximum Values	Average	Standard Deviation	Upper Quartile
Market economy	296	0.215	0.929	0.599	0.191	0.611
Government intervention	296	0.204	0.889	0.529	0.163	0.507
Social fusion	296	0.208	0.727	0.473	0.121	0.461
Capital flow	296	0.426	1	0.855	0.132	0.891
Labor force mobility	296	0.461	0.994	0.739	0.193	0.735
Local fiscal expenditures	296	0	1	0.573	0.299	0.563
Scientific and technical inputs	296	0.159	0.366	0.274	0.039	0.278
Integration of urban and rural areas	296	0.237	0.879	0.562	0.143	0.551

According to Table 4, concerning the market economy, there is a significant positive impact on urban–rural integration at the 0.01 level ( $t = 5.262, p = 0.000 < 0.01$ ), with a regression coefficient of  $0.213 > 0$ . This indicates that the market economy has a significant positive relationship with urban–rural integration. Regarding government intervention, there is significance at the 0.05 level ( $t = 2.364, p = 0.018 < 0.05$ ), with a regression coefficient of  $0.176 > 0$ , suggesting a significant positive impact on urban–rural integration. As for social fusion, it is significant at the 0.01 level ( $t = 3.059, p = 0.002 < 0.01$ ), with a regression coefficient of  $0.083 > 0$ , indicating a significant positive impact on urban–rural integration.

Therefore, we can conclude that market economy, government intervention, and social fusion have significant impacts on urban–rural integration, with the market economy having the greatest influence, thus validating Hypothesis 1.

**Table 4.** Estimated results of factors influencing urban–rural integration (N = 296).

Variant	Baseline Regression (1)	25% (2)	50% (3)	75% (4)
Market Economy	0.213 *** (5.262)	0.498 *** (25.610)	0.459 *** (20.227)	0.565 *** (28.042)
Government Intervention	0.176 ** (2.364)	0.241 *** (8.866)	0.469 *** (12.911)	0.440 *** (14.092)
Social Fusion	0.083 *** (3.059)	−0.249 *** (−13.595)	0.172 *** (9.122)	0.238 *** (11.999)
Constant	0.533 *** (11.209)	0.840 *** (38.296)	1.080 *** (50.077)	1.101 *** (51.584)
Control Variable	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes
Urban Fixed	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.852	0.735	0.741	0.708

\*\*\* and \*\* indicate significant at the 1%, 5% levels, respectively; t-values in parentheses.

From 1986 to 2022, the level of urban–rural integration development in the Greater Bay Area showed steady growth. Hence, the 25%, 50%, and 75% quantile regression models from Table 4 were used to discuss the differences in the factors influencing urban–rural integration at different development stages, summarizing the temporal evolution trends of the driving mechanisms in the Greater Bay Area.

Firstly, regarding the market economy mechanism, it consistently plays a significant positive role. At the 25% level of urban–rural integration, in the initial stage of market development, industrial structures are just being established and invested in, with elements stably flowing between urban and rural areas. For urban–rural integration to develop, the market economy must take the lead as the primary driving mechanism. Therefore, at this stage, the market economy begins to release and gradually strengthen its significant positive effect on urban–rural integration, with a coefficient of 0.498. However, as it moves into the 50% level of urban–rural integration, its impact coefficient begins to decrease to 0.459 but still plays a positive role. As the basic mechanism of urban–rural integration, the market economy plays a crucial role in the initial stages of development in the Greater Bay Area, providing continuous developmental momentum. However, in the mid-term, under specific technical conditions, the development of non-agricultural industries can only absorb labor according to the principle of minimizing costs and cannot fully absorb the continuously incoming surplus rural labor. When these labor employment issues are not resolved, the negative trend of the market economy may expand, and the employment structure becomes less conducive to urban–rural integration, weakening the impact of the market economy. But as it enters the 75% level of urban–rural integration, with the liberalization and restrictions of the market and adjustments in industrial and employment structures, the positive impact of the market economy strengthens again, with a coefficient of 0.565.

Secondly, regarding the government intervention mechanism, due to the Chinese government’s emphasis and application of regulatory measures, government intervention as a guiding mechanism has a significant positive impact on urban–rural integration throughout the process, though the impact coefficient decreases in the later stages. The government promotes the construction of infrastructure and service systems for urban–rural integration through measures such as household registration system reform, balanced allocation of educational resources, adjustment of land-use policies, equalization of urban and rural public services, tax incentives, and poverty alleviation and development, effectively guiding the direction of resource allocation and social development and ensuring balanced and sustainable development in the process of urban–rural integration. At the same time, the government closely monitors new issues that may arise during urban–rural integration, such as urban–rural disparities and environmental protection, and adjusts and

improves relevant policies in a timely way to ensure the healthy and stable development of urban–rural integration. However, entering the 75% level of urban–rural integration, the positive impact coefficient of government intervention decreases by 6.18%. This decrease might be due to a saturation point reached with increased government intervention, leading to diminishing marginal utility of further intervention. As the Chinese government moves towards the construction of a “limited and service-oriented government” in the later stages, government resources and attention are diverted, and with the increasing strength of the market economy, the impact of government intervention on urban–rural integration declines.

Finally, regarding the social fusion mechanism, in the process of urban–rural integration development, social fusion is most closely related to the interests of the people and has a significant driving force for the future development of urban–rural integration. At the 25% level of low urban–rural integration, the social fusion mechanism plays a significant negative role. Combining historical logic, it can be seen that in the early stages of urban–rural integration in the Greater Bay Area, the main focus was on extracting rural resources to develop cities, blocking the flow of elements between urban and rural areas, and concentrating public service and infrastructure supply mainly in cities. This resulted in long-term developmental lags in rural areas in economic, political, and cultural aspects, widening the per capita income gap between urban and rural areas and lowering the sense of gain and identification among rural people. Entering the 50–75% medium-to-high levels of urban–rural integration, the positive impact of the social fusion mechanism gradually unfolds. This is due to the development of information technology, making cultural exchanges between urban and rural areas more frequent and in-depth. Also, the deepening interdependence between urban and rural economies has gradually narrowed the living standards of urban and rural residents as well as equalized public services such as education and healthcare in urban and rural areas, significantly enhancing the sense of gain and identification among rural residents. More importantly, the interactive models between urban and rural areas are constantly innovating. For example, through e-commerce platforms, rural products can be sold directly to cities, and advanced urban technologies and management experiences can be more quickly adopted by rural areas. Through these changes, the social fusion mechanism plays a positive role in the medium-to-high stages of urban–rural integration, effectively promoting balanced development between urban and rural areas. Social fusion will be a key driving mechanism for future urban–rural integration work, laying a solid foundation for achieving higher levels of urban–rural integration.

#### 4.3. Analysis of Regional Heterogeneity

The results of the variance analysis indicate that there are differences in the urban–rural integration index among different areas, and it shows a pattern where the degree of urban–rural integration is in the order of core areas > satellite areas > peripheral areas. This suggests that the core areas have achieved a higher level of urban–rural integration compared to the satellite and peripheral areas. Such disparities highlight the varying success and challenges in urban–rural integration across different regions within the Greater Bay Area (Table 5).

**Table 5.** District ANOVA results.

Area (Mean ± Standard Deviation)	Urban–Rural Integration Development Index
Core Area ( $n = 111$ )	0.58 ± 0.13
Satellite Area ( $n = 111$ )	0.56 ± 0.12
Peripheral Area ( $n = 74$ )	0.43 ± 0.11
F	34.552
$p$	0.000 ***

\*\*\* indicate significant at the 1% levels, respectively.

Looking at the core, satellite, and peripheral areas (as shown in Table 6), the impact of market economy, government intervention, and social fusion on urban–rural integration varies across different areas. In the core areas, the market economy has the most significant impact on urban–rural integration, with a coefficient of 0.449. This indicates that market forces play a key role in driving urban–rural integration in core areas. Government intervention is also an important factor, with a coefficient of 0.391, suggesting that government policies have a significant positive impact on urban–rural integration in core areas. Although social fusion has a weaker impact, with a coefficient of 0.190, it is still significant, indicating that social and cultural integration is also a fundamental driver for urban–rural integration in the core areas of the Greater Bay Area.

**Table 6.** Results of empirical tests on drivers of urban–rural integration in different regions (N = 296).

Variant	Core Area (Guangzhou, Foshan, and Dongguan)	Satellite Area (Huizhou, Zhuhai, and Zhongshan)	Peripheral Area (Jiangmen and Zhaoqing)
Market Economy	0.449 *** (12.130)	0.260 *** (7.541)	0.290 *** (6.062)
Government Intervention	0.391 *** (8.660)	0.206 *** (70.633)	0.332 *** (2.874)
Social Fusion	0.190 *** (7.690)	0.161 *** (3.046)	0.031 (0.822)
Constant	0.715 *** (14.083)	0.442 *** (34.527)	0.632 *** (12.188)
Control Variable	Yes	Yes	Yes
Obs.	111	111	74
R <sup>2</sup>	0.871	0.848	0.867

\*\*\* indicate significant at the 1% levels, respectively; t-values in parentheses.

In the satellite areas, the impact coefficient of the market economy is 0.260, which is smaller than that in the core areas but still significant, indicating that the market also plays an important role in promoting urban–rural integration in satellite areas. Government intervention has a significant impact in satellite areas as well, with a coefficient of 0.206, but this impact is smaller than in core areas, suggesting that government policies have a more limited effect in these areas. The influence of social fusion in satellite areas is similar to that in core areas, showing that social and cultural factors have a positive impact on urban–rural integration in satellite areas.

Finally, in the peripheral areas, both market economy and government intervention have significant impacts on urban–rural integration, with coefficients of 0.290 and 0.332, respectively. However, these impacts are weaker compared to core and satellite areas. The influence of social fusion on urban–rural integration in peripheral areas is not significant, possibly due to the slower or uneven process of social and cultural integration in these areas.

In summary, each area exhibits differences in strategies and priorities for promoting urban–rural integration. Core areas mainly rely on market forces supplemented by government roles, satellite areas focus on the dual roles of market and government, and peripheral areas predominantly depend on government intervention. There is a need to balance the roles of the market and government in peripheral areas and potentially strengthen mechanisms for social fusion, thus confirming Hypothesis 4.

Therefore, by combining regional characteristics and data results, we can help elucidate and discuss the urban–rural integration driving mechanisms suitable for each area: Core areas rely on developed market economies and effective government intervention. The market economy attracts population and capital by providing diverse employment opportunities and an innovative environment, while the government ensures the sustainability and fairness of integration through planning, legislation, and financial support. Satellite areas mainly depend on market forces, especially economic connections with core areas, attracting investment and promoting employment by developing industries

and services complementary to those in core areas, and they may also rely on resources and services from core areas. Peripheral areas need to rely more on government support and intervention, with the government possibly needing to invest more in infrastructure, education, healthcare, and social welfare to promote economic and social development in these areas. At the same time, promoting social and cultural integration is key, especially in areas with lower levels of diversity.

#### 4.4. Threshold Effect Analysis

Drawing on Hansen's research method, it is necessary to test for the presence of threshold effects and the number of thresholds in the sample before using the panel threshold model. This determines the form of the panel threshold regression model. The F-test statistic was obtained by estimating the model, and the "bootstrap method" was used to resample 300 times to calculate the probability value  $p$  and the critical value, which are listed in Table 7.

**Table 7.** Results of the number of thresholds test.

Threshold Variables	Number of Thresholds	F-statistics Value	$p$ -value	Number of BS	1% Threshold	5% Threshold	10% Threshold
Market Economy	Single threshold	383.40	0.0767	300	337.0825	434.8504	545.8524
Government Intervention	Double threshold	130.08	0.4700	300	286.5204	381.5528	504.4823
Government Intervention	Single threshold	183.88	0.0100	300	141.3291	157.4670	177.3829
Government Intervention	Double threshold	122.31	0.3100	300	149.0408	162.1197	185.5103
Social Fusion	Single threshold	116.75	0.0467	300	107.5214	115.1489	131.9969
Social Fusion	Double threshold	58.77	0.2200	300	73.6584	84.6802	109.4418

$p$ -values and critical values are results obtained from 300 iterations of sampling using bootstrap (Stata 15.0).

As shown in Table 7, using the market economy as the threshold variable, the F-statistic for a single threshold rejects the null hypothesis of "no threshold" at the 10% significance level. However, the F-value for the double threshold cannot reject the hypothesis of "only one threshold" at the 10% significance level, confirming the existence of one threshold in the market economy. Similarly, by using government intervention and social fusion as threshold variables, it was concluded that both government intervention and social fusion have one threshold each. After the threshold effect passes the test, the LR statistic is calculated to determine the threshold value, with the threshold values and the 95% confidence intervals listed in Table 8. According to Table 8, the threshold values for market economy, government intervention, and social fusion as threshold variables are  $-1.2292$ ,  $0.6238$ , and  $0.2290$ , respectively.

**Table 8.** Threshold estimation results.

Threshold Variables	Threshold Type	Estimated Value	95% Confidence Interval
Market Economy	Single threshold	$-1.2292$	(0.5445, 0.9520)
Government Intervention	Single threshold	$0.6238$	(0.2209, 0.4841)
Social Fusion	Single threshold	$0.2290$	( $-0.7897$ , 0.0200)

After determining the threshold values, parameter estimation was conducted according to the threshold effect model formula. The parameter estimation results of the threshold panel model are shown in Table 9. Overall, whether the threshold variable is the market economy, government intervention, or social fusion, a significant change occurs in the impact on urban-rural integration development once a certain "threshold" is exceeded, thus validating Hypothesis 2.

**Table 9.** Estimated results of the threshold model (N = 296).

Variant	Market Economy Threshold Model	Government Intervention Threshold Model	Social Fusion Threshold Model
Market Economy		0.1900 *** (4.2100)	0.1958 *** (3.9600)
Government Intervention	−0.3194 *** (−3.9200)		0.2502 ** (3.0600)
Social Fusion	−0.4234 *** (−7.0200)	0.1114 ** (2.8600)	
φ1	0.7483 *** (8.6900)	0.3525 *** (6.3300)	−0.3657 * (−2.0400)
φ2	0.9529 *** (10.0000)	0.2702 *** (6.8100)	0.0883 ** (3.0600)
Constant	−0.4895 *** (−7.5800)	0.5238 *** (10.3600)	0.5754 *** (13.4600)
Control Variable	Yes	Yes	Yes
Obs.	296	296	296
R <sup>2</sup>	0.8365	0.8618	0.8584

\*\*\*, \*\*, and \* indicate significant at the 1%, 5%, and 10% levels, respectively; t-values in parentheses.

### 1. Threshold Regression Analysis of the Market Economy

Conducting a threshold effect test with the market economy as the threshold variable, the estimated coefficient was consistently significantly positive. This indicates that the development of the market economy and its increasing freedom are conducive to facilitating the flow of factors between urban and rural areas, thereby promoting the sustainable development of urban–rural integration. When the level of the market economy is below the threshold (−1.2292), it has a moderate promotional effect on urban–rural integration. Once the level of the market economy crosses this threshold (−1.2292), the estimated coefficient increases from 0.7483 to 0.9529, further releasing and strengthening its promotional effect. As the market economy matures, capital and resources are more likely to flow to cities and rural areas that offer favorable market environments and ample business opportunities, thus accelerating economic integration in these areas. Additionally, innovation and entrepreneurial activities are encouraged, providing more business opportunities and jobs in urban and rural areas, and changing the consumption patterns and lifestyles of residents. In summary, the impact of the market economy on urban–rural integration development exhibits a significant threshold effect and plays an important positive role throughout the entire process of urban–rural integration, improving economic levels and residents' incomes between urban and rural areas, laying a solid foundation for further integration, optimizing the industrial structure between urban and rural areas, and promoting efficient resource allocation and balanced development across regions.

### 2. Threshold Regression Analysis of Government Intervention

Testing the threshold effect with government intervention as the threshold variable, the estimated coefficient was consistently significantly positive but gradually weakened. This suggests that in the process of urban–rural integration development, the government intervention process needs to be controlled at a balance point to effectively promote sustainable urban–rural integration. When the degree of government intervention is below the threshold (0.6238), it significantly positively impacts urban–rural integration. However, once it crosses this threshold (0.6238), the estimated coefficient decreases from 0.3525 to 0.2702, beginning to weaken its promotional effect. This indicates that in the initial stage, government intervention may focus on addressing basic obstacles to urban–rural integration, such as investing in infrastructure, improving rural education and healthcare, etc. These initial interventions can quickly resolve some apparent inequalities and development bottlenecks, significantly promoting urban–rural integration development. Once intervention surpasses the threshold, the previously direct and effective policies might start facing diminishing marginal effects. This is because the initial “low-hanging fruits” have

been harvested, and the remaining issues may be more complex and slower to respond to policy interventions. Excessive government intervention might lead to reduced efficiency in resource allocation and suppress the private sector's enthusiasm, weakening the positive effects of government intervention and reducing the market mechanism's role in urban–rural integration. Therefore, insufficient intervention might be ineffective in promoting urban–rural integration, but excessive intervention can diminish its effects. The ideal level of government intervention is likely near the threshold value (0.6238).

In summary, government intervention significantly positively impacts urban–rural integration development, but this impact changes at different intervention levels. It is crucial to find the most appropriate level of intervention to maximize the positive effects of government policies. Initially, active government involvement is necessary, but as development progresses, the government should gradually adjust its role, allowing more space for market mechanisms and avoiding the negative effects of excessive intervention.

### 3. Threshold Regression Analysis of Social Fusion

When the level of social fusion is below the first threshold (0.2290), its impact on urban–rural integration development is significantly negative, with an estimated coefficient of  $-0.3657$ . When the level of social fusion is above the first threshold (0.2290), its impact becomes significantly positive, with an estimated coefficient of  $0.0883$ . The change in coefficients from negative to positive indicates that as the level of social fusion increases, its impact on urban–rural integration development changes from “inhibitory” to “promotional”.

When the level of social fusion is below the threshold value (0.2290), its impact on urban–rural integration development is negative. This implies that at lower levels of social fusion, there may be significant differences between urban and rural areas. Differences in culture and lifestyle, along with asymmetrical information transfer, can lead to certain cognitive biases or even urban–rural segregation or conflict, thereby hindering the process of urban–rural integration. Additionally, differences in employment opportunities, economic activities, and lifestyles between rural migrants and urban residents may result in difficulties adapting to urban life.

When the level of social fusion is above the threshold value (0.2290), its impact on urban–rural integration development becomes positive. This indicates that at higher levels of social fusion, the differences in culture and lifestyle between urban and rural areas decrease. Increased exchanges of culture, experience, and information promote mutual understanding and cooperation among residents, thus benefiting urban–rural integration. As social fusion deepens, public resources are more likely to flow and be shared between urban and rural areas, reducing the development imbalance between them. This manifests as better economic participation, smoother transportation, higher quality of life, enhanced interconnectedness of information, and more equitable distribution of educational and medical resources. Furthermore, rural residents' identification with and adaptation to urban lifestyles improve, leading to a merging and acceptance of urban and rural lifestyles.

In conclusion, the level of social fusion has a complex and phased impact on the development of urban–rural integration. Social fusion can effectively promote urban–rural integration development, possibly involving adjustments and investments in policies related to cultural exchange, social identity, education, and infrastructure construction. Therefore, social fusion is a multifaceted interactive process involving economic, policy, and socio-cultural aspects, requiring the collaborative efforts of the market, government, and society to achieve it.

#### 4.5. Mechanism Interaction Analysis

As can be seen from Table 10, in the Greater Bay Area, the explanatory power of any two interactive mechanisms for urban–rural integration development is stronger than that of a single mechanism. This indicates that the development of urban–rural integration in the Greater Bay Area is the result of the combined effect of multiple influencing factors, thus validating Hypothesis 3.

**Table 10.** Analysis of Driving Mechanisms for Integrated Urban–Rural Development (N = 296).

Variant	Integration of Urban and Rural Areas (1)	Industrial Integration (2)	Population Integration (3)	Culture Life Integration (4)
Market Economy × Government Intervention	0.440 *** (6.410)	1.263 *** (−8.040)	0.802 *** (15.015)	0.138 *** (2.684)
Market Economy × Social Fusion	0.543 *** (4.592)	0.875 *** (26.466)	0.790 *** (7.932)	1.208 *** (5.421)
Government Intervention × Social Inclusion	0.292 *** (3.217)	0.315 *** (3.662)	0.641 *** (3.374)	0.815 *** (12.271)
Market Economy × Government Intervention × Social Fusion	0.999 *** (4.838)	1.466 *** (14.821)	1.156 *** (9.473)	1.362 *** (10.584)
Constant	0.566 *** (12.028)	0.116 *** (4.814)	0.048 *** (3.480)	0.216 *** (7.944)
Control Variable	Yes	Yes	Yes	Yes
Urban Fixed	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes
Obs.	296	296	296	296
R <sup>2</sup>	0.851	0.891	0.863	0.839

\*\*\* indicate significant at the 1% levels, respectively; t-values in parentheses.

Specifically, in terms of urban–rural integration, the regression coefficient of the interaction of market economy, government intervention, and social fusion is 0.999, representing the strongest interactive effect in urban–rural integration. This suggests that the combined effect of these three elements has a significant positive impact on urban–rural integration. The coefficients for the interactions between market economy and government intervention as well as and market economy and social fusion, are 0.440 and 0.543, respectively. These two interactive effects are relatively strong, indicating that the market economy, by improving the efficiency of resource allocation and promoting economic growth, and government intervention, by formulating and implementing policies, ensure that the benefits of economic growth contribute to coordinated and sustainable urban–rural development. The market economy also drives cultural diversity and innovation, while social and cultural fusion facilitates innovation and diverse development in the market economy, promoting the integration of urban and rural cultures.

Similarly, in industrial integration, the combined effect of market economy, government intervention, and social fusion is most significant, with a coefficient of 1.466. Industrial integration requires the innovative and competitive mechanisms provided by the market economy, policy support and guidance from the government, and the adaptation and integration of social culture. The government can guide industries towards more efficient and urban–rural complementary directions, while social and cultural fusion helps form new industrial cultures and consumption habits, which are all crucial factors in driving industrial integration. The coefficient for the interaction between market economy and government intervention is 1.263, indicating a significant role in promoting industrial integration, where the market economy fosters technological innovation and economic growth, and government intervention ensures that these developments align with long-term social and sustainable goals.

Regarding population integration, the levels of impact of the various mechanisms are relatively close, with the interaction between market economy, government intervention, and social fusion having the largest effect, indicated by a coefficient of 1.156. The combined impact of market economy, government intervention, and social fusion on population integration can be understood as a multifaceted interaction and reinforcement effect. The market economy provides economic growth and job opportunities, promoting population mobility, while government intervention, through policy formulation, ensures social equity and reasonable resource distribution, helping alleviate the inequalities brought about by

the market economy. Social fusion promotes mutual understanding and acceptance of different cultures and lifestyles, reducing cultural barriers between urban and rural areas.

In cultural life integration, the most influential mechanism is the interaction of market economy, government intervention, and social fusion, with a coefficient of 1.362. In the two-way interaction mechanisms, the coefficients for social fusion interactions are relatively high. Cultural life integration requires not only the lifestyle diversity brought by the market economy and the support of government cultural policies and public service equalization but also mutual respect and exchange in culture from all sectors of society. The fusion of cultures helps form an inclusive and diverse social environment, promoting mutual understanding and integration of cultures between urban and rural areas.

Overall, for urban–rural integration and its subsystems, the regression coefficients for the combined interactive effect of market economy, government intervention, and social fusion are the largest. This demonstrates that although market economy, government intervention, and social fusion each have a certain impact on urban–rural integration and its subsystems, their interactive effects provide a more powerful driving force. From these analyses, it is evident that the impact of different mechanism interactions varies across each integration subsystem. In the practice of sustainable urban–rural integration development, it is essential to choose and match these interactive mechanisms based on specific situations and objectives.

## 5. Discussion

This study compiled government work reports and urban–rural integration reform policy texts from eight cities in the Greater Bay Area. Based on the quantitative analysis previously conducted, the following section discusses the development and mechanisms of industrial integration, population integration, and culture life integration within the Greater Bay Area. It summarizes existing problems and tries to accurately reflect the current situation of urban–rural integration in the Greater Bay Area, aiming to better generalize the driving mechanisms of urban–rural integration. Moreover, by comparing with the urban–rural integration driving mechanisms of other international bay areas, it achieves insights into the development of urban–rural integration in the Greater Bay Area.

### 5.1. Relationship Analysis

In the process of urban–rural integration development, industrial integration is the foundation, population integration is the key, and cultural life integration is the ultimate goal. These three aspects complement and promote each other, with the mechanisms of market economy, government intervention, and social fusion working together to drive high-quality development and common prosperity in urban–rural integration and its subsystems.

Firstly, in the early stages of urban–rural integration, industrial integration must take precedence. The premise for industrial integration is to establish a governance pattern where the market decides and the government guides. Industrial integration relies on the mechanism of “market determination of resource and factor allocation” to provide strong momentum. However, blind industrial integration can lead to industry monopolization and market failure. Therefore, the government must play a supplementary role, guiding resource allocation towards urban–rural integration and supporting the construction of a two-way factor flow mechanism between urban and rural areas. Forming an industrial integration structure where the market is primary and the government is auxiliary can effectively stimulate factor mobility and structural, economic, and spatial effects, forming a complementary supply and demand in the industry.

Secondly, the bidirectional flow of human resources is another critical step in urban–rural integration development. Population integration is about allocating human and labor capital according to market demands, achieving labor mobility between cities and rural areas. On one hand, rural labor should integrate into urban industries, while on the other, urban labor should flow into rural areas following market rules. Population integration results from the combined effects of the market and government. Due to the

more comprehensive resources and social welfare in cities, rural populations migrate to urban areas for development or settlement, gradually transitioning them to non-agricultural status. While rural populations move to cities, urban residents also start to integrate into rural areas. The driving mechanisms for urban residents to integrate into rural areas include market-driven entrepreneurship or retirement in rural areas, industrial policy guidance, fair and reasonable policy provision, improved rural public systems and infrastructure, breakdown of the mental barrier between urban residents and farmers to form mutual recognition, and implementation of tax and land incentives for rural entrepreneurship.

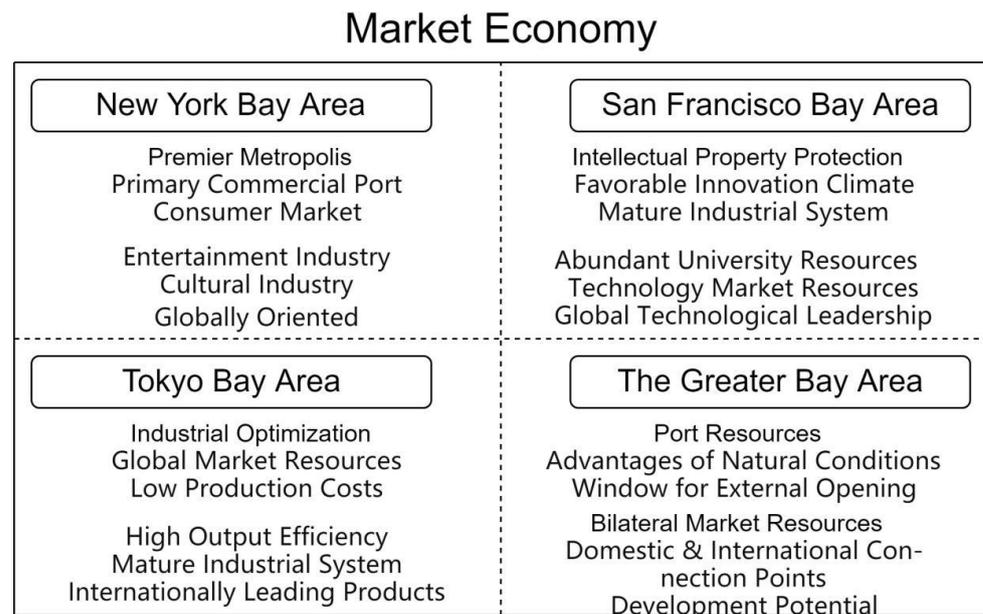
Lastly, cultural life integration is the ultimate goal, effectively promoting material and spiritual prosperity among the populace, satisfying the growing needs for a better life. Urban–rural cultural life integration is reflected as administrative, economic, and social boundaries between villages and cities dissolve; public services are equalized; and mutual recognition between urban and rural residents increases, facilitating bidirectional population and resource flow between cities and villages. This makes both urban and rural lifestyles natural choices for people. To achieve this, it is necessary to first, establish the market’s decisive role in resource allocation and fully utilize the government’s economic regulation and market supervision functions. Economic boundaries will gradually dissolve as the market and capital integrate labor reproduction and bear the costs of production and reproduction, gradually dissolving the segregation between rural populations and cities. Enterprises and factories will fully respect the rights of rural populations, allowing villagers and migrant workers to freely choose employment in various industries. The government will ensure equal pay for equal work among rural and urban populations by setting corresponding wage standards and improving labor laws. Through these mechanisms, there will be a full flow of human, material, and financial resources between urban and rural areas, and social exclusion and injustice will gradually weaken, accumulating and re-accumulating social fusion between rural populations and cities. Second, by gradually abolishing the household registration system, administrative boundaries will be broken, eliminating household registration as a boundary for urban–rural resident identity. Urban and rural residents will have equal rights in social security, employment, education, and medical care, reducing social exclusion significantly. Social boundaries will blur, and social class mobility will accelerate. Third, based on the dissolution of administrative and economic boundaries, coupled with reforms in urban–rural institutional supply and cultivation of social fusion and inclusiveness mechanisms, rural culture will no longer be a barrier to urban–rural cultural life integration. Rural populations will continuously integrate with urban systems in values, ideologies, lifestyles, language, etc., adjusting their social roles and gradually undergoing resocialization. The government will foster an inclusive integration atmosphere by welcoming rural populations with friendly urban management policies, gradually eliminating rural stigmatization. Influenced by this, urban residents will also increase interaction and psychological identification with rural populations. Rural populations will actively participate in urban and community activities, strengthening their sense of belonging to the city and gradually moving away from being marginalized.

## *5.2. Comparison of the Four Major International Bay Areas*

The Greater Bay Area of China distinguishes itself from the other three major bay areas (San Francisco Bay Area, New York Bay Area, and Tokyo Bay Area) through its unique approaches to market economy, government intervention, and social fusion in the realm of urban–rural integration. These distinctions not only underscore the unique developmental strategies employed by each bay area but also offer insightful lessons for the urban–rural integration development within China’s Greater Bay Area. Herein lies a comparative analysis of these bay areas across the specified mechanisms and the potential lessons for China’s Greater Bay Area.

Regarding the market economy mechanisms, the San Francisco Bay Area significantly leans on the dynamism of the market economy and the private sector’s driving force, especially in high-tech and innovative industry sectors, with the emergence of Silicon

Valley as the quintessential example. The market economy also plays a pivotal role in the New York Bay Area's development, albeit with a stronger reliance on its financial services sector. The Tokyo Bay Area's growth predominantly hinges on the unique symbiotic model between Japanese corporate conglomerates and the government, underscoring a more pronounced role of government intervention in economic endeavors. In contrast, China's Greater Bay Area melds the features of the Chinese socialist market economy, where government intervention is instrumental in steering regional development. Concurrently, there is an ongoing effort to liberalize market entry, stimulate the private economy, and attract international investments. A comparison of the market economy mechanisms across these bay areas is shown in Figure 4 [57].



**Figure 4.** Comparative Analysis of Market Economy Mechanisms Across the Four Major Bay Areas.

Regarding the differences in government intervention mechanisms, the San Francisco Bay Area and New York Bay Area, while dominated by market forces in economic development, have seen the government implementing a series of policies in public service sectors such as education, health, and housing to ensure equity and enhance the quality of public services. Government intervention in the Tokyo Bay Area is more pronounced not only in infrastructure development but also in guiding and supporting corporate activities as well as investing in innovation and technological development. The government in China's Greater Bay Area has adopted active industrial and social policy interventions to promote urban–rural regional integration and economic development, including cross-border infrastructure construction and sharing of innovation resources. A comparison of these government intervention mechanisms is presented in Figure 5 [58].

In terms of differences in social fusion mechanisms, the San Francisco Bay Area's diversity and culture of inclusivity provide fertile ground for innovation and technological development, with social enterprises and non-profit organizations playing roles in societal integration. The New York Bay Area, with its diverse culture and active community participation, enriches social life and promotes global thinking and international cooperation. Unlike the emphasis on cultural diversity and societal openness in the American bay areas, the Tokyo Bay Area showcases a harmonious coexistence of Japanese tradition and modernity, where social policies and planning, social order, and civic consciousness play crucial roles in the urban–rural integration process. The Greater Bay Area of China possesses unique cultural diversity and potential for social integration, combining the international perspective of Hong Kong and Macau with the cultural traditions and innovation capabilities of mainland cities, bringing innovative vitality and diversity to the region's

development. Additionally, China is fully advancing the equalization of urban and rural public services and the Rural Revitalization Strategy, narrowing the gap in cultural life between urban and rural areas. A comparison of social fusion mechanisms is shown in Figure 6 [59].

### Government Intervention

<p><b>New York Bay Area</b></p> <p>Oriented towards the Financial Sector Innovation Incubation Industry Access</p> <p>Education, Health, and Housing Market Incentives Financial Regulation</p>	<p><b>San Francisco Bay Area</b></p> <p>Oriented towards the Technology Sector Enhancing Competitiveness Tax Reductions and Exemptions</p> <p>Talent Attraction Government Procurement Public Service</p>
<p><b>Tokyo Bay Area</b></p> <p>Focused on Industrial Development Industrial Revival Social Welfare infrastructure Small and Medium-sized Technology Enterprises Urban-Rural Industrial Collaboration</p>	<p><b>The Greater Bay Area</b></p> <p>Geared towards Overall Development Outline of Development Planning for the Greater Bay Area Strategic Policy Documents</p> <p>Cross-border Infrastructure Construction Urban-Rural Innovation Resource Sharing</p>

Figure 5. Comparison of Government Intervention Mechanisms Across the Four Major Bay Areas.

### Social Fusion

<p><b>New York Bay Area</b></p> <p>Multiculturalism and Immigration Active Community Participation Highly Developed Logistics and Information Technology Rural Capital Inflow and Urban Sociocultural Spillover American Dream Strategy</p>	<p><b>San Francisco Bay Area</b></p> <p>The Integration of Technology and Culture An Open and Inclusive Atmosphere Participation of Social Enterprises and Non-Profit Organizations in Social Integration Flexible Lifestyles Innovation and Educational Opportunities</p>
<p><b>Tokyo Bay Area</b></p> <p>Education and Healthcare Policies Urban Planning and World-Class Transportation Systems Active Urban and Rural International Trade Shared Urban and Rural Cultural Facilities Mutual Assistance Consciousness</p>	<p><b>The Greater Bay Area</b></p> <p>Equalization of Urban and Rural Public Services Improvement of Urban and Rural Infrastructure Spirit of Struggle and Inclusiveness Rural Revitalization Strategy Utilizing Hong Kong Resources to Promote the Return Flow of Capital and Information to village</p>

Figure 6. Comparison of Social Fusion Mechanisms Across the Four Major Bay Areas.

In summary, the New York Bay Area is predominantly market-driven, emphasizing the integration of economic diversification and cultural diversity, with urban–rural integration reflected in the wide coverage of economic opportunities and social welfare. The San Francisco Bay Area, driven by technology and innovation, achieves urban–rural integration primarily through the diffusion of technological innovation and the knowledge economy. The Tokyo Bay Area’s urban–rural integration is mainly manifested in promoting the development of suburbs and surrounding satellite cities to achieve a more balanced population

and economic distribution, fostering regional integration by improving transportation networks and providing public services. The Greater Bay Area of China emphasizes promoting urban–rural integration through institutional innovation and open cooperation and driving economic development through technological innovation and industrial upgrading while promoting the integration of cultural life within the region through the equalization of basic urban and rural public services, emphasizing the triple role of market order, government guidance, and social fusion in promoting balanced urban–rural development.

Therefore, the experiences of other bay areas offer the following insights for the urban–rural integration development of China’s Greater Bay Area: The Greater Bay Area should enhance the decisive role of the market in resource allocation while ensuring government guidance and support in key areas and infrastructure construction. By encouraging private enterprises and international investments, especially in high-tech and innovative industries, economic structure optimization and upgrading can be promoted. Strengthening regional policy coordination and integrated development, eliminating administrative barriers, and promoting resource sharing and industrial complementarity are crucial. The government needs to adopt proactive policies to promote urban–rural integration, improve rural infrastructure and public services, and foster an organic combination of economic and social development. Meanwhile, strengthening cultural exchanges and integration, respecting and protecting cultural diversity, and promoting common values and social cohesion are essential. Leveraging the advantages of internationalization to promote open and inclusive cultural policies and international cooperation can enhance the region’s global competitiveness and attractiveness.

## 6. Conclusions and Implications

### 6.1. Conclusions

Urban–rural integration is fundamental to China’s socio-economic development and is a pressing demand of the people for a better life. Therefore, it is crucial to grasp the development trends and levels of urban–rural integration, identify its influencing factors, and improve the driving mechanisms of urban–rural integration development. Viewing villages and cities as a community with a shared destiny, we must gradually advance urban–rural integration towards sustainable development. Based on the above analysis, this study concludes the following:

First, from 1986 to 2022, urban–rural integration development in the Greater Bay Area steadily advanced, showing increasing effectiveness. The level of urban–rural integration development in various regions fluctuated upwards. Industrial integration started high and developed rapidly; population integration began low and developed steadily; cultural life integration started with a negative index and developed slowly. The development curve of urban–rural integration is closely aligned with industrial integration, suggesting a significant contribution of industrial integration to urban–rural integration. Currently, the curve of population integration aligns with the urban–rural integration development curve, indicating the emerging role of population integration. However, cultural life integration has not yet unleashed its force in promoting urban–rural integration development.

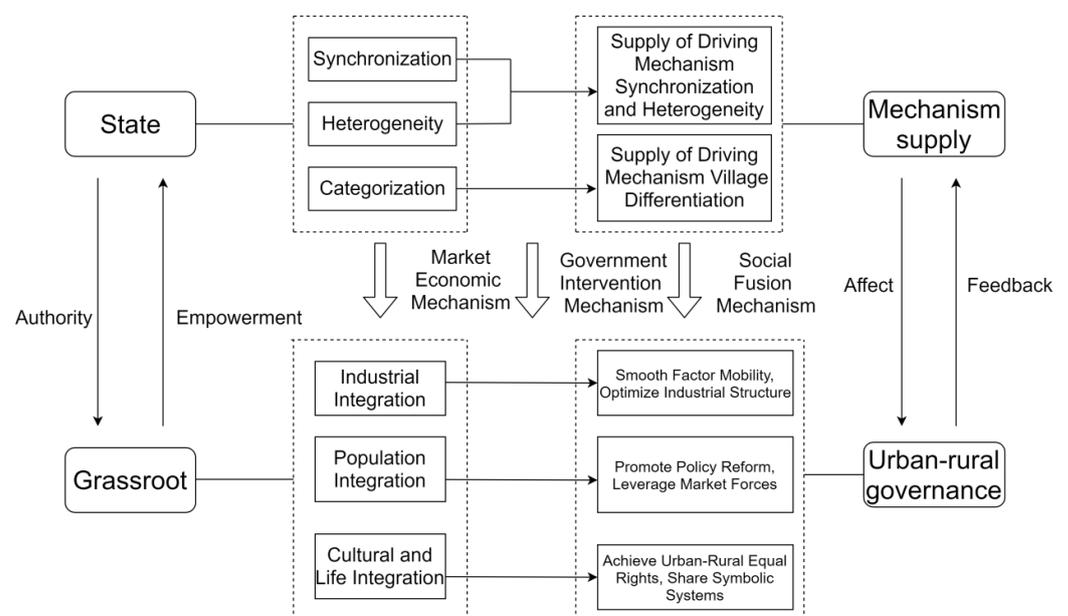
Second, market economy, government intervention, and social fusion significantly impact urban–rural integration, with the market economy having the greatest effect. Over time, the market economy mechanism has consistently exerted a positive influence, with the effect coefficient showing a trend of “strengthening-weakening-re-strengthening”. Government intervention always shows a significant positive impact, but its effect coefficient has declined in the later stages. The impact of the social fusion mechanism has not been fully unleashed yet, showing a “suppression-promotion” trend with a relatively low effect coefficient.

Third, each region has different strategies and priorities in promoting urban–rural integration. The core areas mainly rely on market forces supplemented by government action, the satellite areas focus on the dual role of the market and government, and the peripheral areas mainly depend on government intervention. Balancing the roles of the market and government is essential, and enhancing the mechanisms of social fusion is needed.

Fourth, all three urban–rural integration driving mechanisms exhibit threshold effects, necessitating the management of the optimal range of mechanism supply. The effect coefficient of the market economy is consistently significant and positive, strengthening as it crosses the threshold, showing a “strengthening-re-strengthening” trend. Government intervention always produces a significant positive impact on urban–rural integration, but its effect weakens after crossing the threshold, indicating a “strengthening-weakening” trend. This suggests that the government needs to control the degree of intervention. When social fusion is below the threshold, it negatively affects urban–rural integration development; after crossing the threshold, it turns positive, showing a “suppression-promotion” trend.

Fifth, the explanatory power of the interaction of any two driving mechanisms of urban–rural integration development is stronger than that of a single mechanism. This indicates that urban–rural integration development results from multiple influencing factors working together. In urban–rural integration and its subsystems, the regression coefficients of the combined interaction of market economy, government intervention, and social fusion are the highest. The impact strength of different mechanisms varies in each integration subsystem, and mechanisms should be chosen and combined according to specific situations.

Sixth, the realization of urban–rural integration requires the implementation of urban–rural integration driving mechanisms in accordance with the principles of “synchronization, heterogeneity, and categorization”. The government needs to simultaneously use market economy mechanisms, government intervention mechanisms, and social fusion mechanisms rather than relying on a single driving mechanism. For industrial integration, population integration, and cultural life integration, it is necessary to provide empowerment-based supply according to the characteristics of the three types of integration rather than equal proportion supply. Based on the uniqueness of core areas, satellite areas, and peripheral areas, we should provide regionally differentiated and categorized driving mechanism supplies. We need to strive to achieve the following three principles: facilitate the flow of elements and optimize the industrial structure; promote policy reforms and leverage market forces; and achieve urban–rural equal rights sharing a common symbolic system (Figure 7).



**Figure 7.** Urban–rural integration driving mechanisms and optimization paths.

## 6.2. Implications and Limitations

Urban–rural integration development essentially breaks down the traditional urban–rural dual system, placing cities and rural areas on an equal footing. It maximizes the advantages

and functions of both, enabling bidirectional flow of production factors, rational distribution of productivity, and equitable allocation of public resources, forging a path of mutual benefit and win–win cooperation between urban and rural areas. Urban–rural integrated development does not imply identical development of urban and rural areas but stresses a unified market, integrated systems, and shared culture between them. It is not a zero-sum game of one side’s loss being another’s gain but is instead a symbiotic process of shared outcomes between urban and rural areas.

The development of urban–rural integration is not only crucial for the welfare of the global population but also pivotal for the future of world development. The future trend of urban and rural development is inevitably towards complete integration, where the talents of all members of society are fully developed through urban–rural integration. The opposition between urban and rural areas began with the transition from barbarism to civilization, from tribal systems to nation states, and from regional limitations to national transitions, and it has pervaded all of civilization’s history until now. In other words, transitioning from urban–rural opposition to urban–rural integration is a long historical process. We must deeply understand the changes in urban–rural relationships and their practice, scientifically grasp the trends of urban–rural development, promote coordinated and integrated urban–rural development, and strive to form a new type of urban–rural relationship where industry promotes agriculture, cities lead rural areas, and urban–rural integration is achieved. Efforts should be made to realize the concept of “beauty in each, shared beauty for all” between cities and rural areas; bridge the “last mile” of social governance; and build a new model of urban–rural integrated development where industries are co-constructed, people live together, and culture is shared.

This study investigated the level of urban–rural integrated development, its influencing factors, spatiotemporal evolution, and driving mechanisms and initially proposes an explanatory framework for industrial integration, population integration, and cultural life integration. The veracity of these findings awaits further validation and may contain omissions, such as overlooking the integration of urban–rural environments and spatial integration, which can be further explored in future research. Moreover, this paper uses only eight cities from the Guangdong–Hong Kong–Macao Greater Bay Area as a case study to explore the factors and mechanisms driving urban–rural integration, and the universality of the conclusions requires further verification and in-depth research. Future studies could try to incorporate new influencing factors and control variables to refine the conclusions of this paper.

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