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Research on the impact of opening-up on the consumption gap between urban and rural residents in China

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I. Research background



The dual economic structure is a typical economic phenomenon in developing countries (Lewis et al., 1954).

After 1949, China showed a typical dual economic structure, with significant dual differences between workers and peasants and between urban and rural areas.

The economic reform since 1978 was first successful in agriculture and rural areas, narrowing the dual difference between workers and peasants and between urban and rural areas.

1978-1984 was the weakening period of the dual structure.

Urban reform was started in 1985, followed by the rapid growth of urban economy, but the agricultural growth slowed down, and the dual economic structure was strengthened again (Guo Jinchuan et al., 2011).

In 2017, the Central government pointed out that the biggest imbalance in China's development is the imbalance between urban and rural development, and the biggest inadequacy is the insufficiency of rural development.

I. Research background



Regarding the imbalance between urban and rural development and the gap between urban and rural areas, the existing literature mainly focuses on public services (Zhang Fan et al., 2022), infrastructure (Chen Feng et al., 2014) and income gap.

Among them, most of the literature measures the urban-rural gap from the perspective of income gap, and believes that adjusting income distribution is an important problem to be solved to achieve common prosperity (Li Wei, 2023; Yin Zhichao et al., 2023).

Compared with income, household consumption can not only reflect the level of common prosperity, but also reflect the actual people's well-being.

In terms of total household consumption, as an important basis for expanding domestic demand (Yao Shujie et al., 2023), consumption has increasingly become an important momentum driving economic growth, and plays an important role in improving the living standard of residents (Liu Hao et al., 2023).



I. Research background



Economic opening to the outside world is China's basic national policy. Promoting economic development by utilizing foreign capital and developing foreign trade (investment opening, trade opening) plays an important role in the coordinated development of urban and rural economy and increasing the income and consumption of urban and rural residents.

There are few studies on whether opening up will have an impact on urban and rural consumption, and only focus on the consumption structure (Liu Ying, 2007; Cao Jingjing, et al., 2019) and the change in total consumption (Tang Xiangjun, et al., 2019). The problem of whether opening up will narrow the consumption gap between urban and rural areas remains to be solved.



I. Research background



Based on this, this paper focuses on the following questions:

1. Is Opening-up conducive to narrowing the gap between urban and rural consumption?
2. What kind of opening-up policy does China need at the present stage?
3. How to make the dividends of opening-up fairly and fully benefit both urban and rural areas?

II. Mathematical model



We establish a model to briefly analyze the impact of opening-up on the consumption level of urban and rural residents, and further establish a mathematical model to study the impact of opening-up on the consumption gap between urban and rural residents, and put forward relevant hypotheses accordingly: opening-up can narrow the consumption gap between urban and rural residents.

(i) Opening-up and the consumption level of urban and rural residents

1. Production sector

Introduce foreign advanced technology and knowledge to improve the level of urban and rural technology;

Opening-up can promote urbanization and make the rural population transfer to the cities.

2. Family sector

Opening-up can promote the consumption level of rural residents

(ii) Opening-up and the consumption gap between urban and rural residents

Opening-up can narrow the consumption gap between urban and rural residents

III. Empirical Model



This paper constructs a spatial Durbin model, and mainly analyzes the impact of opening-up on the consumption gap between urban and rural residents from two perspectives: trade opening and investment opening.

(i) Model setting

The following spatial Durbin model is developed for analysis in this paper:

$$\begin{aligned}
 Theil_{it} = & \alpha_0 + \rho \sum_{j=1}^n W_{ij} Theil_{it} + \alpha_1 Lnopen_{it} + \alpha_2 Gov + \alpha_3 Is + \alpha_4 Trans \\
 & + \alpha_5 Urbl + \alpha_6 Est + \alpha_7 Tech + \theta_1 \sum_{j=1}^n W_{ij} Lnopen_{it} \\
 & + \theta_2 \sum_{j=1}^n W_{ij} Gov_{it} + \theta_3 \sum_{j=1}^n W_{ij} Is_{it} + \theta_4 \sum_{j=1}^n W_{ij} Trans_{it} \\
 & + \theta_5 \sum_{j=1}^n W_{ij} Urbl_{it} + \theta_6 \sum_{j=1}^n W_{ij} Est_{it} + \theta_7 \sum_{j=1}^n W_{ij} Tech_{it} + \varepsilon_{it} \quad (20)
 \end{aligned}$$

III. Empirical Model



(ii) Spatial weighted matrix selection

The spatial weighted matrix W can reflect the degree of spatial association of each province. Considering the limitations of the adjacency matrix and the inverse geographic distance matrix, this paper further constructs following economic-geographic nested weighted matrix.

$$W = W_d * \text{diag} \left(\frac{pgdp_1}{pgdp}, \frac{pgdp_2}{pgdp}, \dots, \frac{pgdp_n}{pgdp} \right) \#(21)$$

In equation (21), W_d refers to the inverse geographic distance matrix, and $pgdp$ is the average value of GDP per capita for all regions in each year.

III. Empirical Model



(iii) Variable selection

1. Explanatory variables: Opening-up includes two aspects of opening, namely trade opening and FDI (Zhang Xiaoxi, et al., 2016). Trade opening is measured by the ratio of total import and export to GDP, and FDI is measured by the actual utilization amount of foreign direct investment.
2. Explained variable: the consumption gap is mainly measured by the ratio of per capita consumption of urban residents to per capita consumption of rural residents (Xiong Ying et al., 2022) and Theil index (Wei Junying et al., 2022; S. C., 2022), considering the impact of demographic changes on consumption, Theil index is selected as the explained variable in this paper.
3. Control variables: According to the existing literature, the government policy, industrial structure, traffic conditions, urbanization, real estate market and innovation degree are selected as control variables (Xiong Ying et al., 2022; Wei Junying et al., 2022; Zhang Tongjin et al., 2021; Wang Jian et al.)

III. Empirical Model



Variables description

Type	Symbols	Definition	Measures
Explanatory variables	openinv	FDI	Actual utilization amount of Foreign direct investment
	opentra	Trade Opening	Total imports and exports/GDP
Explained variable	Theil	Theil index	Calculated from equation (22)
Control variables	gov	Government Policy	Local general common public budget expenditure/GDP
	is	Industry Structure	Secondary and tertiary industry value added/GDP
	trans	Traffic conditions	Road miles/total population
	urbl	Urbanization	Urban population/total population
	est	Real Estate Market	Residential housing construction area of real estate development enterprises
	tech	Degree of innovation	Technology market turnover

IV. Empirical Results and Analysis



(i) Spatial correlation test

Before conducting the regression analysis, it is necessary to use Moran's I to test the spatial correlation between the explained variable urban-rural consumption gap and the core explanatory variable opening-up.

Table 2_Moran's I tests

Year	Theil-Moran'I	Theil P value	Openinv Moran'I	Openinv p value	Opentra Moran'I	Opentra p-value
2013	0.450	0.000	0.150	0.060	0.278	0.003
2014	0.451	0.000	0.167	0.049	0.292	0.003
2015	0.516	0.000	0.317	0.002	0.320	0.001
2016	0.495	0.000	0.418	0.000	0.307	0.002
2017	0.422	0.000	0.421	0.000	0.304	0.002
2018	0.417	0.000	0.400	0.000	0.211	0.005
2019	0.383	0.000	0.432	0.000	0.284	0.004
2020	0.292	0.003	0.418	0.000	0.303	0.002

The results of the Moran's I test show that the positive spatial correlation of Opening-up is significant.

IV. Empirical Results and Analysis



(ii) Spatial analysis

From the empirical results, it is shown that:

1. **Local trade opening** can significantly reduce the consumption gap between urban and rural residents.

However, the spillover effect brought by non-local import and export share will make the urban-rural consumption gap in local province widen.

2. **Local FDI** also has a significant effect on narrowing the consumption gap between urban and rural residents, but the spillover effect is not significant.

3. **For the control variables:**

Local traffic condition can significantly reduce the consumption gap between urban and rural residents;

Local urbanization can significantly reduce the consumption gap between urban and rural residents;

Non-local government policy can significantly reduce the consumption gap between urban and rural residents;

Industrial structure can significantly reduce the consumption gap between urban and rural residents;

Non-local Real estate market development can significantly reduce the consumption gap between urban and rural residents.

IV. Empirical Results and Analysis



(II) Spatial analysis

Table 3 Impact of trade opening on consumption gap between urban and rural residents

	(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)
	Economic geography nesting	Inverse-geographic distance	0-1 adjacency		Economic geography nesting	Inverse-geographic distance	0-1 adjacency		Economic geography nesting	Anti-geographic distance	0-1 adjacency
Lnopentra	-0.804**	-0.372	-0.533	W*Lnopentra	2.724***	9.444***	-0.839	Spatial			
	(0.373)	(0.391)	(0.345)		(0.996)	(2.662)	(0.789)	rho	0.217	-0.207	0.308***
gov	0.705	1.000*	0.35	W*gov	-7.063**	-1.619	0.324	Variance			
	(0.650)	(0.592)	(0.585)		(3.445)	(6.613)	(1.394)	sigma2_e	0.282***	0.247***	0.231***
IS	1.108**	1.297***	1.088**	W*is	2.105	5.717	0.473				
	(0.479)	(0.489)	(0.430)		(2.265)	(6.182)	(0.587)				
trans	-0.004*	-0.002	-0.005**	W*trans	0.006	0.037	-0.003				
	(0.003)	(0.002)	(0.002)		(0.007)	(0.029)	(0.004)				
urbl	-22.786***	-27.393***	-17.871***	W*urbl	26.914	-123.968***	2.212				
	(5.471)	(5.276)	(6.335)		(20.547)	(45.091)	(13.618)				
lnest	-0.106	-0.641	0.97	W*lnest	-6.148**	-9.726**	-1.960**				
	(0.718)	(0.777)	(0.627)		(2.997)	(4.450)	(0.944)				
Intech	-0.078	-0.025	-0.152	W*Intech	-0.443	-0.137	-0.198				
	(0.125)	(0.129)	(0.110)		(0.674)	(1.166)	(0.226)				

Note: *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively, with the corresponding robust standard errors in parentheses.

IV. Empirical Results and Analysis

(II) Spatial analysis

Table 4 Impact of FDI on the consumption gap between urban and rural residents

	(1)	(2)	(3)		(1)	(2)	(3)		(1)	(2)	(3)
	Economic geography nesting	Anti-geographic distance	0-1 adjacency		Economic geography nesting	Anti-geographic distance	0-1 adjacency		Economic geography nesting	Anti-geographic distance	0-1 adjacency
LnopenInv	-0.536***	-0.636***	-0.375*	W*LnopenInv	0.56	-0.815	-0.541*	Spatial			
	(0.202)	(0.207)	(0.221)		(1.530)	(1.546)	(0.311)	rho	-0.003	0.127	-0.073
gov	-1.169	-1.085	-0.526	W*gov	-1.276	0.041	4.257***		(0.191)	(0.119)	(0.140)
	(1.049)	(0.812)	(0.674)		(12.393)	(10.567)	(1.443)	Variance			
IS	0.172	-0.452	0.274	W*is	-16.541*	-20.946	1.179	sigma2_e	1.314***	1.355***	1.262***
	(1.156)	(1.173)	(1.220)		(9.285)	(13.226)	(1.006)		(0.252)	(0.258)	(0.167)
trans	-0.011	-0.011	-0.019**	W*trans	0.032	-0.02	-0.01				
	(0.009)	(0.008)	(0.009)		(0.117)	(0.102)	(0.014)				
urbl	-11.857***	-10.972***	-9.691***	W*urbl	37.293*	49.270**	-4.212				
	(3.104)	(2.839)	(2.549)		(20.328)	(22.057)	(5.232)				
inest	-0.258	0.144	0.012	W*inest	-1.452	1.237	1.393**				
	(0.514)	(0.464)	(0.384)		(2.650)	(3.709)	(0.625)				
intech	-0.014	-0.062	-0.077	W*intech	-0.292	-0.023	-0.519*				
	(0.156)	(0.162)	(0.159)		(1.317)	(1.246)	(0.286)				

Note: *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively, with the corresponding robust standard errors in parentheses.

IV. Empirical Results and Analysis



(iii) Heterogeneity analysis

The 30 provinces are divided into three regions: eastern, central and western, and inter-regional, and heterogeneity analysis is conducted.

In the eastern region, FDI will significantly widen the consumption gap between urban and rural areas in the province, and **trade opening** has no significant effect on the urban-rural consumption gap.

In the central region, both **investment opening and trade opening** will significantly reduce the urban-rural consumption gap in the province. In addition, the increase in trade opening will also lead to a reduction in the urban-rural consumption gap in neighboring provinces.

In the western region, the coefficients of **trade opening and investment opening** are negative, the two dimensions of opening-up have no significant effect on the urban-rural consumption gap in the region.

However, **investment opening and trade opening** have significant spillover effects, which can promote the reduction of urban-rural consumption gap in neighboring provinces.

IV. Empirical Results and Analysis

(iii) Heterogeneity analysis

	East		Middle		West			East		Middle		West	
	(1)	(2)	(1)	(2)	(1)	(2)		(1)	(2)	(1)	(2)	(1)	(2)
Lnopeninv	0.501***		-0.546**		-0.256		W*Lnopeninv	1.337***		-0.294**		-0.963***	
	(0.181)		(0.238)		(0.211)			(0.465)		(0.128)		(0.228)	
Lnopenra		0.602		-0.896**		-0.587	W*Lnopenra		3.239***		0.315		-3.712***
		(0.570)		(0.443)		(0.493)			(1.232)		(0.741)		(0.802)
gov	0.082	-2.742*	-7.882	-8.953	0.744**	0.503	W*gov	-0.482	-9.254**	7.236	10.544	1.911	3.401**
	(0.670)	(1.601)	(5.180)	(6.642)	(0.303)	(0.641)		(1.050)	(3.614)	(9.270)	(11.907)	(1.243)	(1.342)
is	-0.573	0.543*	19.855**	5.746	-0.143	1.173	W*is	-0.133	1.131*	20.456**	3.835	-0.944	4.874*
	(0.503)	(0.314)	(7.822)	(5.500)	(0.951)	(1.160)		(0.417)	(0.672)	(9.741)	(6.852)	(4.168)	(2.664)
trans	0.000	-0.006**	-0.040	-0.022	-0.002	-0.004*	W*trans	0.010***	0.011***	-0.118	-0.101	0.003	-0.008
	(0.004)	(0.003)	(0.053)	(0.051)	(0.002)	(0.002)		(0.004)	(0.002)	(0.084)	(0.090)	(0.009)	(0.007)
czh	-17.711***	-22.534***	-3.888	-18.904*	-3.606	-4.414	W*czh	-16.218***	-22.516**	36.345***	17.662*	2.894	-5.102
	(0.821)	(5.691)	(11.100)	(10.474)	(7.406)	(7.174)		(1.290)	(9.515)	(13.129)	(10.725)	(30.744)	(25.095)
Infdc	-1.087***	1.085**	-0.691	-1.242	-2.256***	-2.337***	W*Infdc	-0.510	-2.323*	-0.245	0.132	-4.268*	-4.071**
	(0.107)	(0.450)	(1.042)	(0.931)	(0.762)	(0.835)		(0.443)	(1.199)	(1.468)	(2.016)	(2.504)	(1.919)
Intech	0.075	-0.144	-0.362*	-0.578**	-0.276*	-0.193	W*Intech	-0.435***	-0.138	-0.314	-0.623***	-0.066	0.372
	(0.089)	(0.207)	(0.191)	(0.225)	(0.157)	(0.118)		(0.117)	(0.330)	(0.354)	(0.181)	(0.140)	(0.242)
							Spatial						
							rho	0.190***	0.158**	-0.059	-0.027	0.276**	0.027
								(0.065)	(0.075)	(0.047)	(0.056)	(0.121)	(0.171)
							Variance						
							sigma ² _e	0.203**	0.097***	0.220***	0.236***	0.177***	0.158***
								(0.082)	(0.023)	(0.047)	(0.060)	(0.041)	(0.034)
							N	88	88	64	64	88	88

Note: *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively, with the corresponding robust standard errors in parentheses.

IV. Empirical Results and Analysis



(iv) Further analysis

This paper further subdivides the impact of opening-up on the urban-rural consumption gap in different regions into two parts: direct effect and indirect effect.

1. For **FDI**, both direct and indirect effects are significantly positive in the eastern region, and both direct and indirect effects are significantly negative in the central and western regions;

2. For **trade opening**, the indirect and total effects are also significantly positive in the eastern region, and the direct effect is significantly negative in the central region. Both the direct and indirect effects are significantly negative for the western region. This is generally consistent with the above analysis.

In general, the opening-up of the **eastern region** will widen the consumption gap between urban and rural residents. **In the central region**, the opening up can be reasonably distributed between urban and rural areas, promoting the quality of life and consumption level of rural residents, and the spillover effect can promote the reduction of urban-rural consumption gap in neighboring provinces. **In the western region**, the efficiency of FDI is relatively low, and the opening up does not have a significant impact on the behavior of residents' consumption in local province, but can promote the reduction of urban-rural consumption gap in neighboring provinces.

IV. Empirical Results and Analysis



(iv) Further analysis

Table 6 Direct and indirect effects by regions

		East	Middle	West
Openinv	Direct effect	0.632***	-0.539**	-0.348
		(0.162)	(0.235)	(0.224)
	Indirect effects	1.598***	-0.277**	-1.346***
		(0.599)	(0.130)	(0.258)
	Total effect	2.230***	-0.816***	-1.694***
		(0.626)	(0.284)	(0.373)
Opentra	Direct effect	0.852	-0.916**	-0.579
		(0.647)	(0.441)	(0.514)
	Indirect effects	3.588**	0.389	-3.812***
		(1.605)	(0.834)	(0.567)
	Total effect	4.440**	-0.527	-4.392***
		(2.041)	(1.052)	(0.448)

←
Empirical results 1

←
Empirical results 2

Note: *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively, with the corresponding robust standard errors in parentheses.

IV. Empirical Results and Analysis



(V) Robustness tests

In this paper, we construct the economic distance weighted matrix for robustness testing.

The results of the robustness tests are shown in Table 7.

The results indicate that opening-up can significantly reduce the consumption gap between urban and rural residents, and there is a spatial spillover effect.

The direction and significance of the regression coefficients of the control variables and their corresponding spatial lag term coefficients are basically consistent with the previous analysis, therefore, the conclusions of this paper are robust.

IV. Empirical Results and Analysis



(V) Robustness tests

Table 7 Robustness tests

	(1)	(1)		(1)	(1)		(1)	(1)
	Trade Opening	Open for Investment		Trade Opening	Open for Investment		Trade Opening	Open for Investment
Lnopentra	-0.803**		W*Inopentra	-1.930*	-0.67	Spatial		
Trade Opening	(0.389)			(1.131)	(0.446)	rho	-0.059	-0.404***
Lnopenv		-0.576***	W*gov	1.014	2.706	Variance	(0.156)	(0.128)
Open for Investment		(0.202)		(2.189)	(1.673)	sigma2_e	0.264***	1.347***
gov	1.103	-0.467	W*is	2.954	-8.088**		(0.039)	(0.207)
Government Policy	(0.690)	(0.760)		(2.027)	(3.749)			
is	0.838***	0.008	W*trans	-0.011	-0.004			
Industry Structure	(0.313)	(1.228)		(0.010)	(0.012)			
trans	-0.003	-0.006	W*urbl	-5.015	-6.27			
Traffic conditions	(0.003)	(0.005)		(16.702)	(7.196)			
urbl	-22.746***	-12.401***	W*Inest	2.701	0.687			
Urbanization	(7.094)	(3.967)		(2.012)	(1.240)			
Inest	0.195	0.231	W*Intech	0.158	0.753**			
Real Estate Investment	(0.747)	(0.494)		(0.259)	(0.305)			
Intech	-0.056	0.099						
Degree of innovation	(0.126)	(0.140)						

Note: *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively, with the corresponding robust standard errors in parentheses.

V. Research Conclusion



First, local **trade opening** can significantly reduce the gap between urban and rural residents' consumption in the province, but the spillover effect will make the consumption gap in neighboring provinces widen. Local **FDI** also contributes to narrowing the consumption gap between urban and rural residents, but the spillover effect is not significant.

Second, **there is regional heterogeneity in the impact and spillover effect of opening-up on the consumption gap between urban and rural residents.** **In the eastern region,** opening-up widens the consumption gap between urban and rural residents in the local province and has a inhibition effect on the narrowing of the consumption gap in other provinces; **in the central region,** an increase in the level of opening-up significantly reduces the urban-rural consumption gap; while **in the western region,** opening-up does not have a significant effect on the behavior of both urban and rural residents' consumption in local province, but has a inhibition effect on the consumption gap between urban and rural residents in other provinces.

Third, convenient transportation, urbanization, government policies and the development of the real estate market can all effectively narrow the consumption gap between urban and rural residents.

VI. Policy Recommendations



Based on the above conclusions, the opening-up should be promoted from the following three aspects, so that the dividends of opening-up are fairly and fully benefit to urban and rural areas.

First, it is necessary to promote urbanization in a concerted manner to increase the income of rural residents, to release the growth potential of rural consumption.

Second, it is necessary to adopt differentiated support policies and focus on the opening of trade and investment in the central and western regions.

Third, it is still necessary to improve the infrastructure in rural areas to increase the level of opening-up and modernization of agriculture .

Thank you!!!



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