

Original Paper

Research on the Impact of New Urbanization on Industrial Transformation and Upgrading

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Abstract

Based on the panel data of 285 prefecture-level cities in China from 2010 to 2020, the policy net effect of the new urbanization strategy on industrial transformation and upgrading is evaluated by using PSM-DID. The research results show that the new urbanization strategy has a significant and sustained positive effect on industrial transformation and upgrading. The mechanism test results show that the new urbanization strategy promotes the industrial transformation and upgrading by influencing the regional financial development.

Keywords

new urbanization, industrial transformation and upgrading, PSM-DID

1. Introduction

As an important way to promote the coordinated development of regions, the new urbanization development strategy plays an important role in optimizing China's regional economic layout in the new era. Since the new urbanization strategy was put forward in 2014, it has achieved phased results. In 2022, China's urbanization rate will reach 64.7%, providing important support for promoting regional coordinated development. The new urbanization emphasizes "human-centered", which not only requires a steady increase in the urbanization rate, but also pays attention to the equalization of public services, sustainable development of cities and towns. Industry is the basis of urbanization development, and urban construction promotes industrial agglomeration. There is an interdependent relationship between the two. Since the implementation of the new urbanization strategy, China's industrial structure has undergone profound changes, but how much of it is the impact of the new urbanization strategy still needs to be further tested. Identifying the net policy effect of new urbanization on industrial transformation and upgrading can provide experience iteration for the new

round of urbanization construction.

Existing research has conducted rich discussions on industrial transformation and upgrading, mainly from the following aspects. First, measure the level of industrial transformation and upgrading. Second, explore the realization path of industrial transformation and upgrading. Throughout the existing research, the following aspects need to be improved. First, there is a reverse causal relationship between new urbanization and industrial transformation and upgrading. It is necessary to discuss endogenous issues, when discussing the relationship between them. Second, there is a consensus that the new urbanization has a positive role in promoting industrial transformation and upgrading, but whether the impact is sustainable and the role path is not clear enough. Therefore, this paper constructs a “quasi-natural experiment” based on the issuance of the National New Urbanization Plan (2014-2020) in 2014. Based on the panel data of 285 prefecture-level cities in China from 2010 to 2020, it uses PSM-DID to empirically test the policy effect of the new urbanization strategy on industrial transformation and upgrading, and then conducts the robustness test and heterogeneity analysis. Finally, some suggestions are put forward. The marginal contribution of this paper is to take the new urbanization strategy as an exogenous policy impact, evaluate the net effect of the policy, and avoid endogenous problems. Secondly, verify whether the impact of the new urbanization strategy on industrial transformation and upgrading is sustainable, and clarify the role path of the new urbanization on industrial transformation and upgrading, provide experience summary for the development of the new urbanization strategy, and enrich the realization path of industrial transformation and upgrading.

2. Theoretical Mechanism and Research Hypothesis

2.1 The New Urbanization Strategy will Promote the Industrial Transformation and Upgrading

The new urbanization strategy has been put forward since 2014, marking that China’s urbanization process has entered a new stage. The construction of new urbanization provides essential support and institutional guarantee for industrial transformation and upgrading. The surplus rural labor force goes to work in cities, provides sufficient labor production factors for the development of the secondary and tertiary industries, promotes the growth of non-agricultural output value, and is conducive to the upgrading of industrial structure. Moreover, the reduction of rural labor force will promote the rationalization of industrial structure as a whole. Secondly, the construction of new urbanization will promote the upgrading of the demand side. Under the requirement of synchronous upgrading of the supply side, the industrial development will be promoted to the direction of green ecology, efficient and intensive development. At the same time, the construction of new urbanization is based on the goal of “interaction between industry and city”. When formulating relevant industrial policies, the government must take into account the rationality of industrial layout, actively introduce innovative and intensive industries, and provide a good institutional guarantee for industrial transformation and upgrading. Therefore, this paper proposes hypothesis 1: The new urbanization strategy will promote the industrial transformation and upgrading.

2.2 The Impact of the New Urbanization Strategy on Industrial Transformation and Upgrading is Sustainable

In the development of traditional urbanization, the improvement of urbanization rate has been narrowly equated with the development of cities, ignoring the pulling effect of industrial transformation and upgrading on the development of urbanization. As a long-term strategy to promote regional coordinated development, the new urbanization strategy is characterized by “industry-city interaction”. It focuses on cultivating leading industries with vitality and radiation in urban development and expanding the mutual support between cities and industries. Secondly, local governments selected as pilot cities for new urbanization can expand financing channels for urban construction and talent attraction by issuing bonds and other ways, directly promote the accumulation of human capital and optimize urban infrastructure construction. The central and provincial governments will grant transfer payments to the pilot cities, promote the improvement of the education and medical level of the pilot cities, and indirectly promote the accumulation of human capital. The scale effect of industrial agglomeration, human capital accumulation and the improvement of urban infrastructure brought by the construction of new urbanization will accumulate over time. Therefore, this paper proposes hypothesis 2: The impact of the new urbanization strategy on industrial transformation and upgrading is sustainable.

2.3 The New Urbanization Strategy Promotes Industrial Transformation and Upgrading through the Path of Influencing Financial Development

The development of urbanization drives the improvement of regional economic level, and the increase of residents’ savings demand and enterprises’ financing demand. As a bridge for financing, financial institutions play an important role in supporting urban development. The theory of financial agglomeration shows that in the early stage of development, financial resources are attracted by cities and towns and gathered in cities and towns; After a certain stage of development, the financial resources enriched in cities and towns will overflow to the surrounding rural areas, making the dual economic structure turn to the unitary economic structure. However, the existing research finds that China’s financial development is in the previous stage at present, that is, urban development attracts a large number of financial resources, and urbanization promotes financial development. On the one hand, financial development is characterized by efficient allocation of resources, which can provide capital support and innovation support for industrial integration by influencing the allocation of financial resources. Its role in resource allocation is also reflected in reducing the financing costs of enterprises, providing special loans and loan preferences for the development of innovative and intensive industries, and further promoting industrial transformation and upgrading. On the other hand, financial development plays a “poverty reduction effect” in the form of inclusive finance and micro-finance, promoting the increase of residents’ income, upgrading the demand-side consumption, and putting forward higher requirements for the development of supply-side industries. Therefore, this paper proposes hypothesis three: The new urbanization strategy promotes industrial transformation and upgrading through the path of influencing financial development.

3. Model Setting and Variable Description

3.1 Model Setting

This paper uses DID to evaluate the net policy effect of the new urbanization strategy on industrial transformation and upgrading. 171 new urbanization pilot cities in the observation year were regarded as the treatment group and other cities as the control group. Since the release batches of the pilot cities of new urbanization are different, the policy impact time of different cities is different. This paper will give the policy impact time to the pilot cities of different batches. In addition, due to uneven regional development and uneven distribution of resource elements, there may be significant differences between the treatment group and the control group before the policy treatment, which will bring difficulties to identify the net effect of the policy. Therefore, this paper first matched the treatment group and the control group with the tendency score before test. To test hypothesis 1, the following model is constructed to evaluate the average effect of the new urbanization strategy on industrial transformation and upgrading:

$$Y_{it} = a_0 + a_1 did_{it} + \sum a_k Control + \gamma_i + \varepsilon_{it} \quad (1)$$

Model (1), Y_{it} is the explained: industrial transformation and upgrading, which is measured by overall upgrading of industrial structure (TS_1), internal upgrading of industrial structure (TS_2) and rationalization of industrial structure (TL); did_{it} is a dummy variable describing whether the sample is impacted by the policy; Control represents a series of control variables.

In order to test hypothesis 2, refer to Huang (2018), build a model (2) to test the dynamic effect of new urbanization strategy on industrial transformation and upgrading:

$$Y_{it} = \beta_0 + \sum \beta_n did_{it}^n + \sum \beta_k Control + \gamma_i + \varepsilon_{it} \quad (2)$$

In model (2), did_{it}^n represents the dummy variable of the n th year when a region becomes a pilot city of new urbanization. For example, if region i was selected as a pilot city for new urbanization in 2015, did_{it}^n will be assigned a value of 1 in the next n years and 0 in the remaining years. β_n represents the dynamic effect of the new urbanization strategy on industrial transformation and upgrading, and the other variables have the same meaning as in model (1).

In order to verify hypothesis 3, this paper constructs an intermediary model based on the three-step regression intermediary analysis method (Wen, 2014) to explore their impact mechanism.

$$M_{it} = b_0 + b_1 did_{it} + \sum b_k Control + \gamma_i + \varepsilon_{it} \quad (3)$$

$$Y_{it} = c_0 + a_1 did_{it} + c_1 M_{it} + \sum c_k Control + \gamma_i + \varepsilon_{it} \quad (4)$$

In model (3) and model (4), M_{it} represent the intermediate variables, and, b_1, a_1, c_1 is the regression coefficients that focus on. Other variables have the same meaning as in model (1). The test steps of the three-step intermediary regression method are as follows. First, test the significance of a_1 in the model

(1). If it is not significant, withdraw from the intermediary effect test. On the premise of significance, test the coefficients in b_1 、 c_1 , and if both are significant, test a_1 . When a_1 is significant, and compared with the numerical value or significant reduction, it indicates that there is a partial intermediary effect; When a_1 is not significant, it indicates that there is a complete intermediary effect. If at least one of b_1, c_1 is not significant, Sobel test shall be conducted Sobel_Test is significant, indicating that the mediation effect is significant, otherwise, the mediation effect is not significant.

3.2 Variable Description

The explained variable of this paper is industrial transformation and upgrading, focusing on the two dimensions of industrial structure upgrading (TS) and industrial structure rationalization (TL). The upgrading of industrial structure is not only reflected in the overall upgrading of the industry, but also reflected in the upgrading of the internal structure of the industry. Referring to Yuan (2018) and Gan (2011), the overall upgrading of industrial structure (TS₁) is measured by the hierarchical coefficient of industrial structure, and the internal upgrading of industrial structure (TS₂) is measured by the ratio of the output value of the tertiary industry to the secondary industry. The specific calculation formula is:

$$TS1_{it} = \sum_{m=1}^3 y_{i,t,m} \times m, \quad m = 1,2,3 \quad (3)$$

$$TS2_{it} = y_{i,t,3}/y_{i,t,2} \quad (4)$$

In formula (3), it represents the proportion of the output value of the `m` industry in the region `i` in the period `t` to the gross domestic product, and the coefficient of industrial structure hierarchy reflects the transition from the primary industry to the secondary and tertiary industries by giving different weights to the proportion of the three industries. In formula (2), and respectively represent the proportion of the output value of the tertiary industry and the secondary industry in the GDP of region `i` in the period `t`.

The degree of rationalization of industrial structure is measured by the Thiel index, and the specific calculation formula is as follows:

$$TL_{it} = \sum_{m=1}^3 y_{i,m,t} \ln(y_{i,t,m}/l_{i,t,m}), \quad m = 1,2,3 \quad (5)$$

In formula (4), it represents the proportion of the number of people employed in the `m` industry in the region `i` in the `t` period to the total number of people, and the rest is the same as that in formula (2).

The core explanatory variable of this paper is the dummy variable did_{it} . According to the new urbanization pilot list published in 2014, 2015 and 2016, 171 pilot cities were selected as the treatment group, and the rest were the control group. The control group was uniformly assigned a value of 0.

Referring to relevant study, this paper selects other factors related to industrial transformation and upgrading as control variables. The level of economic development determines to a large extent whether the region can form a certain scale of industries. High-level economic development can drive industrial agglomeration and industrial transformation and upgrading. Therefore, per GDP is used to measure the level of economic development (pregdp). The government plays an important role in the

rational allocation of resources during the structural transformation period, so the proportion of government public financial expenditure to GDP is selected to measure the government size (gov). The urban investment level is measured by the proportion of the total fixed assets investment of the whole society in GDP. The level of opening up is measured by the proportion of the city's total import and export to GDP. Infrastructure construction level (infra) is measured by the per road area. See Table 1 for descriptive statistics of variables.

Table 1. Variable and Descriptive Statistics

Variable	Obs	mean	St.
lnTS1	3156	5.4318	0.0631
lnTS2	3156	-0.1147	0.4745
lnTL	3156	0.2903	0.2162
lnpregdp	3156	10.6499	0.6374
lngov	3156	14.8402	0.7721
lninvest	3156	-0.21318	0.4996
lnopen	3156	11.8152	1.8966
lninfra	3156	1.1997	0.8840

3.3 Data Description

Based on the data of 285 cities in China from 2010 to 2020, this paper eliminated the samples with serious data loss, and obtained a total of 3156 city-level balanced panel data. Relevant price data are deflated in the base period of the previous year, and relevant foreign trade data are converted at the exchange rate of the current year.

4. Empirical Test

4.1 Tendency Score Matching

The PSM method can solve the endogenous problems caused by sample self-selection, including kernel matching, nearest neighbor matching, caliper matching. This paper refers to the practice of Qiu (2021), and adopts the one-to-three nearest neighbor matching method without return. Table 2 reports the deviation value and significant change of matching variables before and after the tendency score matching. It can be seen that the absolute value of the deviation value of the control variables after matching is less than 10%, and the variables after matching are not significant. Accept the original assumption that “there is no significant difference between the treatment group and the control group”, and believe that there is no significant difference between the pilot city and the non-pilot city after the tendency score matching, and meet the balance hypothesis test.

Table 2. PSM Balance Hypothesis Test

Variable		Deviation value	Deviation reduction ratio	T value	P value
lnpregdp	before	26.8		7.43	0.000***
	after	2.9	89.2	0.88	0.381
lngov	before	52.3		14.30	0.000***
	after	-0.9	98.3	-0.29	0.769
lninvest	before	11.7		3.29	0.001***
	after	0.7	94.4	0.22	0.829
lnopen	before	45.3		12.43	0.000***
	after	2.8	93.9	0.83	0.409
lninfra	before	26.0		7.29	0.000***
	after	0.8	97.1	0.22	0.826

4.2 Regression

4.2.1 Average Effect of New Urbanization Strategy on Industrial Transformation and Upgrading

Table 3 reports the average effect of new urbanization on industrial transformation and upgrading. Column (1) and (2) test the impact of the new urbanization strategy on the upgrading of industrial structure. The regression coefficients are 0.0487 and 0.0048. Through the 1% significance level test, it shows that the new urbanization strategy has a significant role in promoting the upgrading of industrial structure. Column (3) examines the impact of new urbanization on the rationalization of industrial structure. The indicator of the rationalization of the industrial structure is a negative indicator, and the regression coefficient of did_{it} is significantly negative, indicating that the new urbanization strategy can significantly promote the rationalization of the industrial structure.

To sum up, the new urbanization strategy plays a significant role in promoting industrial transformation and upgrading. Hypothesis 1 has been verified.

Control variable part. The level of economic development (pregdp) and the level of infrastructure (infra) have significantly promoted the upgrading of industrial structure, which is in line with expectations. Government size (gov) and investment level (investment) have a significant negative effect on the upgrading of industrial structure (La Ferrara, Chong, & Duryea, 2012). This may be because the financial expenditure invested in industrial development has not been effectively utilized, and the government has not carried out a reasonable industrial layout when introducing investment, resulting in the convergence of industrial structure and low-level overcapacity, which hinders the upgrading process of industrial structure. In addition, the level of investment has significantly promoted the rationalization of industrial structure, which is in line with expectations. The level of opening to the outside world partially inhibits the upgrading of the industrial structure. The reason may be that the import and export trade is still at the middle and low level, and the proportion of the import and export products are low

level processing is large, which fails to drive the industry to a high level.

Table 3. Average Effect Test of New Urbanization on Industrial Transformation and Upgrading

	(1)	(2)	(3)
	lnTS1	lnTS2	lnTL
did	0.0048***(3.96)	0.0487***(3.77)	-0.0634**(-2.15)
lnpregdp	0.1010***(19.80)	0.9629***(17.80)	0.1900(1.54)
lngov	-0.0085**(-2.53)	-0.0873**(-2.45)	-0.0337(-0.42)
lninvest	-0.0047***(-3.48)	-0.1440***(-10.02)	-0.1070***(-3.25)
lnopen	-0.00049(-1.00)	-0.0319***(-6.21)	-0.0190(-1.62)
lninfra	0.0111***(7.49)	0.0698***(4.42)	0.0755**(2.10)
_cons	4.4739***(185.52)	-8.8090***(-34.44)	-2.9560***(-5.07)
individual effect	yes	yes	yes
N	3088	3088	3088
R ²	0.8980	0.8029	0.7731

Note. t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

4.2.2 Dynamic Effect of New Urbanization Strategy on Industrial Transformation and Upgrading

Table 4 reports the dynamic effect of the new urbanization strategy on industrial transformation and upgrading. In columns (4), (6) and (8), the control variables are not added, which are compared with columns (5), (7) and (9). In columns (4) and (6), the estimated coefficients of the interaction terms on the explained variables lnTS₁ and lnTS₂ are significantly positive. After adding the control variables, in the (5) and (7), the estimated coefficients of the intersection item did¹ to the variables lnTS₁ and lnTS₂ were significantly positive, while the estimated coefficients of did² and did³ failed to pass the 10% significance level test. It shows that the new urbanization strategy can have a continuous positive impact on the upgrading of industrial structure, but the continuous effect is affected by other factors related to urban development. In order to make this positive effect continue to work, it is necessary to ensure that other factors related to urban development promote each other and jointly support the coordinated development of industries. By comparing Column (8) with Column (9), it can be found that the significance of the interaction item on the variable lnTL appears over time. After 2-3 years after being selected as the pilot city of new urbanization, the new urbanization strategy shows a continuous positive role in promoting the rationalization of industrial structure.

To sum up, the sustainability of the new urbanization strategy has promoted the industrial transformation and upgrading. Hypothesis 2 has been verified.

Table 4. Dynamic Effect Test of New Urbanization on Industrial Transformation and Upgrading

	(4)	(5)	(6)	(7)	(8)	(9)
	lnTS1	lnTS1	lnTS2	lnTS2	lnTL	lnTL
did1	0.0360*** (19.64)	0.0039*** (3.04)	0.3320*** (18.77)	0.0488*** (3.58)	0.00841 (0.29)	-0.0403 (-1.30)
did2	0.0260*** (6.22)	-0.0003 (-0.10)	0.1920*** (4.76)	-0.0302 (-1.04)	-0.0959 (-1.47)	-0.131** (-1.99)
did3	0.0350*** (8.24)	0.00272 (0.98)	0.2430*** (5.93)	-0.0409 (-1.38)	-0.150** (-2.27)	-0.198*** (-2.94)
_cons	5.424*** (9097.46)	4.446*** (201.37)	-0.174*** (-30.23)	-9.111*** (-38.96)	-1.564*** (-167.90)	-2.748*** (-5.16)
control	no	yes	no	yes	no	yes
individual effect	yes	yes	yes	yes	yes	yes
N	3088	3088	3088	3088	3088	3088
R2	0.7538	0.8977	0.6064	0.8030	0.7711	0.7735

5. Mechanism Analysis

The previous article demonstrated that the new urbanization strategy has a significant role in promoting industrial transformation and upgrading, but it is not clear how to achieve this role. To test hypothesis 3, this paper constructs an intermediary model to test the intermediary effect. The financial level of the intermediary variable is measured by the proportion of urban deposit and loan balance to GDP. Table 5 reports the intermediary effect test of financial level as an intermediary variable. The coefficients in columns (10), (11) and (12) are highly significant. The new urbanization strategy promotes the overall upgrading of industrial structure through financial development. According to the regression results of columns (10), (13) and (14), the new urbanization strategy promotes the internal upgrading of industrial structure through financial development, in which the level of financial development reflects part of the intermediary effect. In the column (10), the regression coefficient of the core explanatory variable did to the intermediate variable lnfinan is significant, but in the column (15), the regression coefficient of the intermediate variable to the explained variable lnTL is not significant. Sobel test is needed to determine whether the intermediate effect exists. The results show that Z statistic of test is 2.429, and the P value is 0.0151. Through the 5% significance level test, it is believed that there is an intermediary effect, that is, the new urbanization strategy can promote the rationalization of industrial structure through the level of financial development.

To sum up, new urbanization can promote the transformation and upgrading of industrial structure by affecting the level of urban financial development. Hypothesis 3 was verified.

Table 5. Analysis of Intermediary Mechanism Based on Financial Level

	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	lnfinan	lnTS1	lnTS1	lnTS2	lnTS2	lnTL	lnTL
did	0.0197*** (2.97)	0.0044*** (3.71)	0.0037*** (3.18)	0.0459*** (3.62)	0.0389*** (3.12)	-0.0724** (-2.43)	-0.0712** (-2.38)
lnfinan			0.0352*** (10.69)		0.3529*** (10.07)		-0.0636 (-0.76)
_cons	-4.504*** (-34.06)	4.476*** (188.34)	4.635*** (167.74)	-8.830*** (-34.99)	4.476*** (188.34)	-3.150*** (-5.32)	-3.437*** (-4.89)
control	yes	yes	yes	yes	yes	yes	yes
individua	yes	yes	yes	yes	yes	yes	yes
I effect							
N	3156	3156	3156	3156	3156	3156	3156
F	811.79	875.29	796.29	618.86	875.29	5.62	4.90

6. Research Conclusions and Policy Recommendations

Based on the panel data of 285 prefecture-level cities in China from 2010 to 2020, this paper evaluates the net policy effect of the new urbanization strategy on industrial transformation and upgrading by using the propensity score matching double difference method. The research results show that the new urbanization strategy has a significant and sustained positive effect on industrial transformation and upgrading. The mechanism test results show that the new urbanization strategy promotes the industrial transformation and upgrading by influencing the regional financial development.

Based on the research conclusion, this paper puts forward the following suggestions. First of all, we should continue to promote the construction of new urbanization, focus on industrial coordination, innovation-driven, green development and other aspects in the construction of new urbanization, explore the development path of resource-saving and innovation-driven urbanization, optimize the livable function of cities and towns on the basis of improving the number of urban population, attract high-quality production factors to gather in cities and towns, and drive the economic development of surrounding areas (Li, Lu, & Wang, 2016). Secondly, optimize the financial system, give financial support to credit and environmental protection enterprises with large capital demand, and give full play to the important role of financial support in resource allocation. We will explore the role of inclusive finance and micro-finance in narrowing the urban-rural income gap and deepen the poverty reduction effect of financial development. Promote the radiation of financial elements from cities to surrounding areas. Finally, when introducing foreign capital, the government should formulate a long-term plan for industrial development in combination with the current situation of regional development, and avoid the cost of sacrificing the environment or causing low-level industrial agglomeration in order to blindly

introduce capital. In order to ensure the sustainability of the positive impact of new urbanization on industrial transformation and upgrading, we should give full play to the supporting role of industrial transformation and upgrading on urbanization, optimize urban public services and infrastructure construction, extend the industrial lifeline, make the impact of new urbanization policy have a cumulative effect, and ensure the continuous effectiveness of new urbanization strategy.

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