# Impact of Transport Infrastructure on Living Standards: Evidence from the Chinese Provinces Directly Affected by the "One Belt, One Road" Initiative

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**Research Article**

**Abstract**

***Purpose:*** *This paper discusses the impact of transport infrastructure on living standards in the Chinese provinces directly affected by the "One Belt, One Road" initiative.*

***Methods:*** *The impact of transport infrastructures such as railways and highways on people's living standards, more specifically, the household consumption level in the Chinese provinces directly affected by the "One Belt, One Road" was analyzed based on data from 2008 to 2017 from National Bureau of Statistics of China and some databases related to the "One Belt, One Road". Descriptive statistics, correlation, and regression were applied for analysis.*

***Results:*** *a)The living standards are not improved in proportion to the development level of railways and highways due to influences of various factors on living standards, b) the development level of transport infrastructure does not have enough impact on reducing the gap in living standards between urban and rural areas in the Chinese provinces under study, c) the development level of transport infrastructure has a relatively more significant impact on living standards in coastal provinces than inland provinces under study, and d) in the future, the measures to develop the transport infrastructure may provably contribute to achieving targets for enhancing the living standards under the realization of the "One Belt, One Road" initiative.*

***Implications****: To enhance the living standard, the management of investment in transport infrastructure as well as other factors, such as employment, income distribution, supply of goods and services, price level, etc. affecting people's living standard ought to be improved in line with the features of a given region.*

**Keywords:** Transport Infrastructure, Household Consumption Expenditure, Urban Household Consumption Expenditure, Rural Household Consumption Expenditure, One Belt, One Road, Chinese Economy.

## 1. Introduction

In the future, the "One Belt, One Road" (OBOR) initiative proposed by China in 2013 will significantly affect the sustainable economic growth and people's consumption level in China (National Development and Reform Commission 2015). The particular element of the OBOR initiative is the infrastructural connectivity, and transport infrastructure (TI) such as railways, roads, ports, and airports will be the particular focus (Haggai, 2016). In this context, it is necessary to consider the relationship between TI and living standards and how much TI affects the living standards in the Chinese provinces directly affected by OBOR. The living standard is the indicator reflecting the socio-economic situation in a given region, and one of the key aims of the OBOR initiative is to enhance the people's living standards in China. Studies until now have mainly been focused on how the infrastructures, in particular, TI affect people's income or poverty level. Many scholars have studied the impact of TI on the increase in income and the decrease in income differences and demonstrated that TI positively affected these aspects. However, these studies have no generality in a view of the features of a given region, and whether or not the OBOR initiative positively affects the people's living standards. Therefore, it is significant to analyze these impacts in the Chinese provinces directly affected by OBOR. From this, the following research questions need to be answered.

*RQ1: Does the development of TI positively affect the living standards, and*

*RQ2: How does the development of TI affect the differences in living standards between urban and rural regions?*

This paper aims to analyze the relationship between the household consumption level and TI's elements such as railways and highways in the Chinese provinces directly affected by OBOR. Based on the research purpose, this paper is organized as follows. In the first section, we have discussed the previous studies which analyzed the impact of TI on income and poverty reduction. The second section analyzes the relationship between the development level of TI and household consumption expenditure (HCE) and the difference between urban household consumption expenditure (UHCE) and rural household consumption expenditure (RHCE), using the data from 2008 to 2017 with regards to province-specific HCE, UHCE, RHCE, length of railways in operation, and length of highways, using descriptive statistics, and graphic description approach. The third section analyzes the impacts of the development level of TI's elements such as densities of railways and highways on HCE and the difference between UHCE and RHCE according to the inland and coastal provinces based on correlation and regression analysis. The rest of the paper discusses the results, discussions, and conclusion.

## 2. Previous studies on the impact of infrastructure on income and poverty reduction

In past studies, the mainstream focus was on the impacts of TI on economic growth, employment, and income. Among them, the research close to this study is the one on the impact of TI on income and poverty reduction. Calderón and Servén (2004) studied the impact of infrastructure on economic growth and income distribution and demonstrated that the development of infrastructure positively affected poverty alleviation using a large panel data set encompassing over 100 countries and spanning the years from 1960 to 2000. López (2003) also assesses the contribution of infrastructure to both growth and income distribution using telephone density as the infrastructure indicator and finds that infrastructure raises growth and reduces income inequality. Ferreira (1995) presents a model in which expansion of public investment reduces inequality, Estache (2003) illustrates that infrastructure gives additional productive opportunities and brings more revenues by helping poorer individuals and underdeveloped areas to get connected to core economic activities. Also, Gannon and Liu (1997) find that infrastructure development in poorer regions reduces production and transaction costs, thus increasing income. Estache and Fay (1995) find that enhanced access to roads and sanitation has been a key determinant of income convergence for the poorest regions. Jacoby (2000) observes that improvements in communication and road services imply capital gains for poor farmers.


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Some scholars demonstrate that enhancing the availability and quality of infrastructure services for the poor in developing countries has a significant positive impact on their health and/or education and, hence, on their income and welfare as well (for example, Brenneman and Kerf, 2002; Leipziger et al. 2003; Behrman and Wolfe, 1987; Lavy et al. 1996; Lee et al. 1997; Galiani et al. 2002). Estache et al. (2000) said that to reduce income inequality, infrastructure expansion, improved access, and/or enhanced quality are needed for low-income households. Mu and van de Walle (2007) suggest that road improvements can exert an almost immediate impact on poverty reduction through the human capital channel, and Khandker et al. (2009) demonstrate that rural roads can contribute to poverty alleviation by providing access to markets and human capital facilities. Furthermore, they find that road development led to a statistically significant increase in annual per capita consumption of 11 % in project villages. Fan et al. (2002) find that irrigation infrastructure directly contributes to the growth of the agricultural sector and to poverty alleviation. Fan and Zhang (2008) emphasized the importance of the market access channel in alleviating poverty in poor countries. Studying the relationship between the well-being of the poor and irrigation infrastructure in Indonesia, Balisacan and Pernia (2002) show that a 1 % increase in the proportion of irrigated farm area to total farm area leads to a 0.23–0.31 % increase in the mean per capita consumption expenditures

According to Huang et al. (2005), the incidence of poverty would fall by 1.6 % points if all non-irrigated agricultural land were irrigated. Bhattarai and Narayanamoorthy (2003) also demonstrate the positive impact of irrigation on poverty reduction. On the other hand, based on Ugandan data, Deininger and Okidi (2002) demonstrate that access to key public goods, such as electricity determines households' ability to increase their income and reduces the risk of falling into poverty. According to Warr (2005), the government's investment in TI in underdeveloped regions helps in falling the incidence of poverty and in reducing income inequality. Zou et al. (2008) find that the TI investment is the source of economic growth, but the eastern region is faster than the middle and western region in economic growth, and the expansion of TI investment increases the income gap because of the imbalance of regional transport investment emerges in China. Yang and Huabei (2017) analyzed the relationship between the investment stock of rural infrastructure and the consumption of rural residents and demonstrated that in different regions and different types of infrastructure, the effect on consumption is different using the data of 30 provinces in China from 2000 to 2010. Summarizing the views of several scholars who considered the impact of TI on the income gap, Chunping and Menghan (2019) showed that China's transportation infrastructure construction has significantly narrowed the income gap using China's provincial panel data from 2000 to 2010. According to them, for every 1% increase in transportation infrastructure density, the income distribution gap will be reduced by 0.015 6%.

As seen from a previous study, the impact of TI on living standards has been considered limited in revenue and income gap, and poverty alleviation. People's living standards are mainly concerned with consumption rather than income or revenue, and thus, it is significant to study how the TI project affects people's consumption levels under OBOR.

This paper focuses on analyzing the impact of infrastructural projects under OBOR on regional living standards, and thus, discusses the relationship between TI and HCE in the Chinese provinces directly affected by OBOR.

## 3. Material and methods

According to National Development and Reform Commission et al. (2015), the provinces directly affected by OBOR are nine, which include 5 inland provinces, [Shaanxi, Gansu, Ningxia Autonomous Region (Hereafter, Ningxia), Qinghai, and Xinjiang Uygur Autonomous Region (Hereafter, Xinjiang)] and 4 coastal provinces [Fujian, Guangdong, Guangxi Autonomous Region (Hereafter, Guangxi), and


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Hainan]. These regions are along with routes under OBOR, and thus, they are directly affected by OBOR. The study is based on data from the year 2008 to 2017 for the above-mentioned nine Chinese provinces. Data are from the National Bureau of Statistics of China and various databases related to OBOR. Important elements of TI under study are railways and highways in terms of physical measurements. Furthermore, we have used relative values, not absolute values regarding TI such as railways and highways to ensure the comparability among provinces in the study. This paper aims to study the relationship between the development level of TI and living standards according to Chinese provinces, thus, ensuring the comparability among provinces in indicators is of significance. In general, previous studies didn't consider region-specific features for the purpose of studying the overall TI, and thus, didn't bring forward the issue of ensuring the comparability among provinces in the study as important. From this, we have used indicators such as density of railways (㎞/1000 ㎢) and density of highways (㎞/1000 ㎢) as they reflect TI's development level. The reason for selecting the HCE indicator like the one reflecting the living standards is that this directly reflects the people's living standards. In the previous study, there have been many discussions on the impacts of TI on income and poverty reduction, but income itself is not consumption. The factors affecting people's consumption include income, price level, supply level of goods and services, employment rate, the propensity to consume, and so on, and these affect the process of transforming income into consumption. Besides, factors such as price level, supply level of goods and services, and employment rate are much related to infrastructure. From this, we have selected the indicator reflecting the HCE as the consumption level. Data to make the above calculations are published by the National Bureau of Statistics of China. In other words, we have used the data regarding HCE (yuan), UHCE (yuan), RHCE (yuan), length of railways in operation (km), and length of highways (km) for nine Chinese provinces directly affected by OBOR. These data can serve as a basis for calculating the indicators to ensure comparability among provinces in this study.

## 4. Results and Analysis

### 4.1. Descriptive statistics and Graphical Presentation

To analyze the relationship between the development level of physical TI and HCE, we have calculated the indicators reflecting the difference between UHCE and RHCE, and the densities of railways and highways according to provinces and years, and put these processed data into graphs. Calculating the (UHCE-RHCE) (yuan), densities of railways and highways, and their averages are as follows (see tables 1 and 2).

**Table 1. Province- and year-specific (UHCE- RHCE) (yuan), densities of railways and highways, and their averages (Inland provinces)**

| Province | Indicator | Year | | | | | | | | | | Year-specific mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| Shaanxi | HCE (Yuan) | 6,483 | 7,154 | 8,474 | 10,053 | 11,852 | 13,206 | 14,812 | 15,363 | 16,657 | 18,485 | 12,253.9 |
| | (UHCE-RHCE) (Yuan) | 8,230 | 8,876 | 10,217 | 11,516 | 12,471 | 13,000 | 13,979 | 13,933 | 14,438 | 15,457 | 12,212 |
| | The density of railways[a] (㎞/1000 ㎢) | 15.564 | 16.050 | 19.941 | 19.941 | 19.941 | 21.400 | 21.887 | 21.887 | 22.373 | 24.31 | 20.3307 |
| | The density of highways[b] (㎞/1000 ㎢) | 637.15 | 700.875 | 717.4125 | 739.299 | 785.0195 | 803.501 | 812.7432 | 827.3346 | 839.0078 | 848.24 | 771.0603 |
| Gansu | HCE (Yuan) | 4,947 | 5,509 | 6,234 | 7,493 | 8,542 | 9,616 | 10,678 | 11,868 | 13,086 | 14,203 | 9,217.6 |
| | (UHCE-RHCE) (Yuan) | 7,495 | 7,991 | 8,755 | 9,597 | 10,485 | 11,082 | 12,264 | 13,225 | 14,347 | 14,949 | 11,019 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | The density of railways (㎞/1000 ㎢) | 5.6364 | 5.6364 | 5.6364 | 5.6364 | 5.8713 | 6.1061 | 7.984 | 8.9243 | 9.6289 | 11.038 | 7.2099 |
| | The density of highways (㎞/1000 ㎢) | 248.0038 | 267.731 | 279.2391 | 290.512 | 308.1259 | 313.762 | 324.3307 | 329.0277 | 335.8384 | 334.19 | 303.0765 |
| Qinghai | HCE (Yuan) | 5,830 | 6,501 | 7,326 | 8,744 | 10,289 | 12,070 | 13,534 | 15,167 | 16,751 | 18,020 | 11,423.2 |
| | (UHCE-RHCE) (Yuan) | 6,695 | 7,410 | 8,030 | 8,443 | 8,910 | 10,663 | 11,245 | 12,108 | 12,256 | 11,753 | 9,751 |
| | The density of railways (㎞/1000 ㎢) | 2.353593 | 2.35359 | 2.630486 | 2.63048 | 2.630486 | 2.63048 | 2.907379 | 3.184272 | 3.184272 | 3.1842 | 2.768932 |
| | The density of highways (㎞/1000 ㎢) | 78.36079 | 83.2064 | 86.1138 | 89.0211 | 91.37478 | 97.0510 | 100.6507 | 104.6657 | 108.8191 | 112.00 | 86.90294 |
| Ningxia | HCE (Yuan) | 7,108 | 7,918 | 8,992 | 10,937 | 12,120 | 13,537 | 15,193 | 17,210 | 18,570 | 21,058 | 13,264.3 |
| | (UHCE-RHCE) (Yuan) | 8,547 | 9,610 | 10,834 | 11,938 | 12,265 | 12,609 | 12,758 | 14,991 | 15,404 | 15,931 | 12,489 |
| | The density of railways (㎞/1000 ㎢) | 12.04819 | 13.5542 | 18.07229 | 19.57831 | 19.57831 | 19.57831 | 19.57831 | 19.57831 | 19.57831 | 21.0843 | 18.222892 |
| | The density of highways (㎞/1000 ㎢) | 316.2651 | 328.313 | 338.8554 | 368.975 | 399.0964 | 430.722 | 471.3855 | 500 | 510.5422 | 521.08 | 418.5241 |
| Xinjiang | HCE (Yuan) | 5,521 | 5,945 | 7,400 | 8,895 | 10,675 | 11,401 | 12,435 | 13,684 | 15,247 | 16,736 | 10,793.9 |
| | (UHCE-RHCE) (Yuan) | 7,196 | 7,337 | 8,991 | 10,168 | 12,032 | 12,343 | 12,317 | 12,838 | 13,456 | 14,657 | 11,134 |
| | The density of railways (㎞/1000 ㎢) | 1.686747 | 2.22891 | 2.53012 | 2.59036 | 2.831325 | 2.83132 | 3.313253 | 3.554217 | 3.554217 | 3.5542 | 2.867469 |
| | The density of highways (㎞/1000 ㎢) | 88.37349 | 90.7831 | 92.04819 | 93.4939 | 99.93976 | 102.530 | 105.7229 | 107.4096 | 109.6988 | 111.62 | 100.1626 |
| Total mean[c] | HCE (Yuan) | | | | | | | | | | | 11,390.58 |
| | (UHCE-RHCE) (Yuan) | | | | | | | | | | | 11,321 |
| | The density of railways (㎞/1000 ㎢) | | | | | | | | | | | 10.27999 |
| | The density of highways (㎞/1000 ㎢) | | | | | | | | | | | 335.9453 |

Source: National Bureau of Statistics of China (2019)

Note: a. Length of railways in operation (km)/Area (1 000㎢),

b. Length of highways in operation (km)/Area (1 000㎢),

c. Sum of the province- and year-specific means / Number of provinces


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**Table 2. Province- and year-specific (UHCE- RHCE) (yuan), densities of railways and highways, and their averages (Coastal provinces)**

| Province | Indicator | Year | | | | | | | | | | Year-specific mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| Fujian | HCE (Yuan) | 10,645 | 11,336 | 13,187 | 14,958 | 16,144 | 17,115 | 19,099 | 20,828 | 23,355 | 25,969 | 17,263.6 |
| | (UHCE-RHCE) (Yuan) | 9,261 | 9,414 | 10,731 | 11,326 | 11,126 | 11,578 | 11,734 | 11,571 | 12,206 | 12,589 | 11,154 |
| | The density of railways[a] (㎞/1000 ㎢) | 13.1795 | 17.2981 | 17.29819 | 17.29819 | 18.94563 | 22.24053 | 23.06425 | 26.35914 | 26.3591 | 26.3591 | 20.84019 |
| | The density of highways[b] (㎞/1000 ㎢) | 729.8188 | 737.232 | 749.5881 | 760.2965 | 780.0659 | 819.6046 | 833.6079 | 861.6145 | 879.736 | 889.621 | 804.1186 |
| Guang--dong | HCE (Yuan) | 13,911 | 15,243 | 17,211 | 19,578 | 21,823 | 23,739 | 24,582 | 26,365 | 28,495 | 30,762 | 22,170.9 |
| | (UHCE-RHCE) (Yuan) | 14,126 | 15,319 | 16,904 | 17,673 | 19,371 | 20,526 | 17,542 | 19,049 | 19,883 | 21,314 | 18,171 |
| | The density of railways (㎞/1000 ㎢) | 12.22222 | 13.8888 | 15 | 15.55556 | 15.55556 | 19.44444 | 22.22222 | 22.22222 | 23.3333 | 23.3333 | 18.27777 |
| | The density of highways (㎞/1000 ㎢) | 1017.778 | 1027.77 | 1056.111 | 1059.444 | 1082.778 | 1127.222 | 1178.333 | 1200 | 1211.66 | 1220 | 1,118.111 |
| Guangxi | HCE (Yuan) | 6,152 | 6,968 | 7,920 | 9,181 | 10,519 | 11,710 | 12,944 | 13,857 | 15,013 | 16,064 | 11,032.8 |
| | (UHCE-RHCE) (Yuan) | 8,086 | 9,161 | 10,175 | 11,010 | 12,102 | 13,390 | 13,874 | 13,637 | 14,266 | 13,599 | 11,930 |
| | The density of railways (㎞/1000 ㎢) | 11.36364 | 13.0471 | 13.46801 | 13.46801 | 13.46801 | 16.83502 | 19.78114 | 21.46465 | 21.8855 | 21.8855 | 16.66666 |
| | The density of highways (㎞/1000 ㎢) | 417.9293 | 422.979 | 428.4512 | 441.4983 | 454.1246 | 468.8552 | 483.5859 | 496.633 | 507.154 | 518.939 | 464.0151 |
| Hainan | HCE (Yuan) | 6,134 | 6,695 | 7,553 | 9,238 | 10,634 | 11,712 | 12,915 | 17,019 | 18,431 | 20,939 | 12,127 |
| | (UHCE-RHCE) (Yuan) | 6,677 | 6,768 | 7,519 | 8,068 | 9,048 | 8,805 | 8,452 | 14,502 | 14,152 | 15,835 | 9,983 |
| | The density of railways (㎞/1000 ㎢) | 11.29944 | 11.2994 | 19.77401 | 19.77401 | 19.77401 | 19.77401 | 19.77401 | 28.24859 | 28.2485 | 28.2485 | 20.62146 |
| | The density of highways (㎞/1000 ㎢) | 525.4237 | 564.971 | 598.8701 | 646.8927 | 686.4407 | 703.3898 | 734.4633 | 759.887 | 796.610 | 867.232 | 688.4180 |
| Total mean[c] | HCE (Yuan) | | | | | | | | | | | 15,648.57 |
| | (UHCE-RHCE) (Yuan) | | | | | | | | | | | 12,809.5 |
| | The density of railways (㎞/1000 ㎢) | | | | | | | | | | | 19.10153 |
| | The density of highways (㎞/1000 ㎢) | | | | | | | | | | | 768.6657 |

Source: National Bureau of Statistics of China (2019)

Note: a. Length of railways in operation (km)/Area (1 000㎢), b. Length of highways in operation (km)/Area (1 000㎢), c. Sum of the province- and year-specific means / Number of provinces


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Calculating the indicator-specific averages in tables 3 and 4 is of significance in studying the differences among provinces comparatively. In other words, it is possible to show the development level of TI, level of HCE, and the difference between UHCE and RHCE according to provinces representatively through a comparison of indicator-specific averages, and understand the relationship between these indicators indirectly. Describing the calculated data with graphs is as follows (Figs 1 and 2).

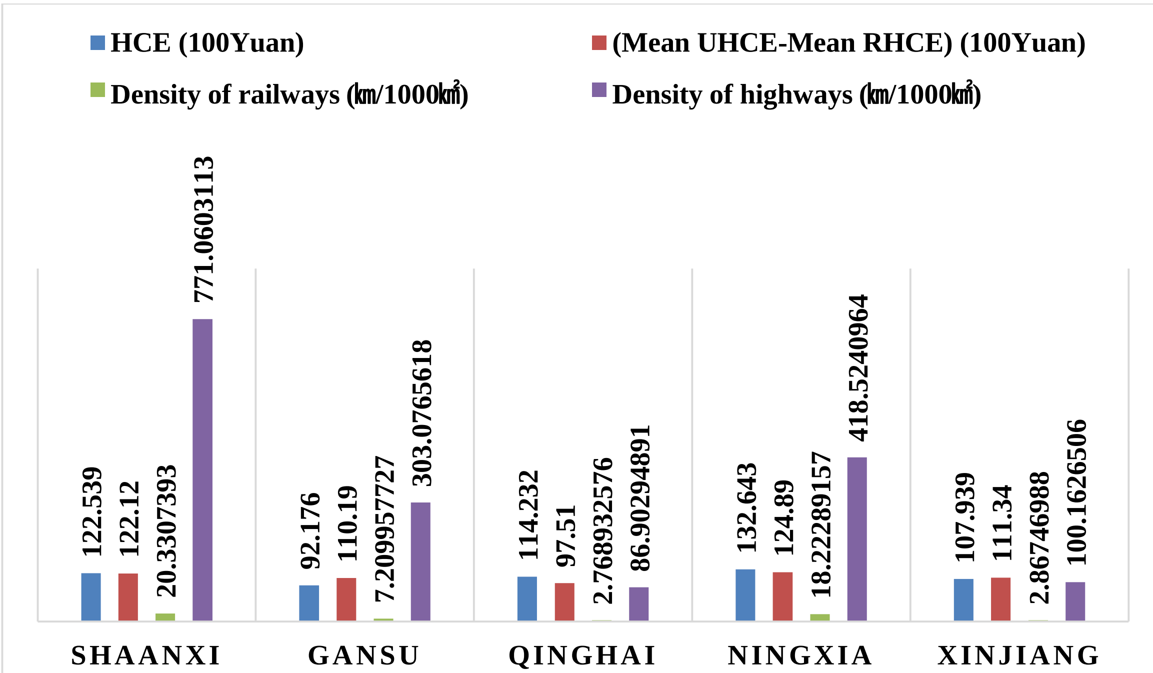


**Fig 1. Province-specific averages of HCE, the difference between UHCE and RHCE, and densities of railways and highways (Inland provinces)**

Source: Based on table 1

As seen in fig 1, among inland provinces, Ningxia has the highest living standards (13,264.3 yuan) and Gansu has the lowest (9,217.6 yuan). On the other hand, Ningxia has the largest difference between UHCE and RHCE (12,489 yuan), and Qinghai has the smallest (9,751 yuan). And Shaanxi is the highest (respectively, 20.3307393km/1000 ㎢ and 771.060311 km/1000 ㎢) and Qinghai is the lowest (respectively, 2.76893257 km/1000㎢ and 86.9029489 km/1000㎢) with regards to the development level of railways and highways. The impacts of the development level of TI on HCE and (UHCE-RHCE) are discussed in the next subsections.

Illustrations in fig 2 are similar to fig 1. Among coastal provinces, Fujian has the highest living standards (17,263.6 yuan), and Hainan has the lowest (1,212.7 yuan). On the other hand, Guangdong has the largest difference between UHCE and RHCE (18,171 yuan), and Hainan has the smallest (9,983 yuan). And while Hainan is the highest (20.6121469km/1000㎢) in terms of railways, Guangdong is the highest (1118.1111 km/1000㎢) in terms of highways. Guangxi is the lowest in both railways and highways (respectively, 18.277778 km/1000㎢ and 464.01515 km/1000㎢).


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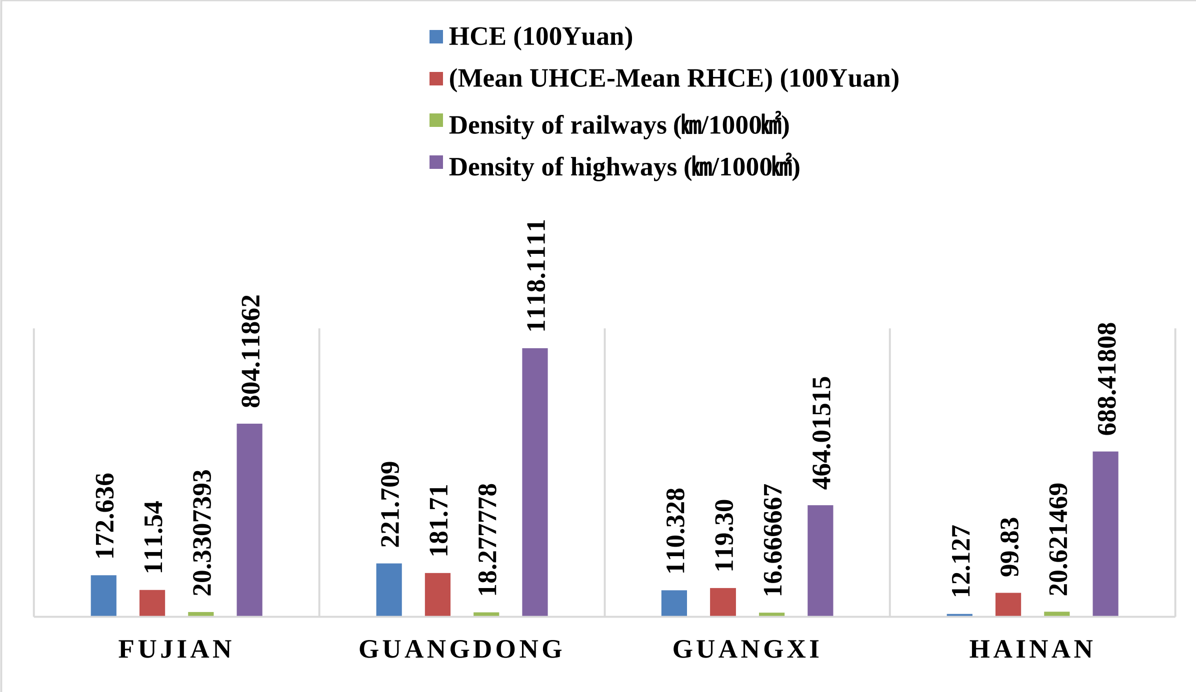


**Fig 2. Province-specific averages of HCE, the difference between UHCE and RHCE, and densities of railways and highways (Coastal provinces)**

Source: Based on table 2

Comparison of province-specific averages has merits of showing the indicator-specific differences according to provinces but has demerits of not conducting the summary assessment for all inland and coastal provinces dynamically. From this, it is possible to calculate year-specific averages of every indicator for all of inland and coastal provinces and to study general tendencies based on them (see tables 3, 4 and figs 3, 4).

**Table 3. Year-specific averages of HCE, UHCE, RHCE, the difference between UHCE and RHCE, and densities of railways and highways (All inland provinces)**

| Indicator | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean HCE (100Yuan) | 597.78 | 660.54 | 768.52 | 922.44 | 1,069.56 | 1,196.6 | 1,333.0 | 1,465.8 | 1,606.2 | 1,770.0 |
| Mean UHCE (100Yuan) | 1,056.7 | 1,147.1 | 1,305.7 | 1,496.7 | 1,679.86 | 1,830.4 | 1,981.9 | 2,142.9 | 2,295.0 | 2,467.1 |
| Mean RHCE (100Yuan) | 293.44 | 322.7 | 369.22 | 463.48 | 556.6 | 636.46 | 730.66 | 801.04 | 897 | 1,012.2 |
| (Mean UHCE-Mean RHCE) (100Yuan) | 763.26 | 824.48 | 936.54 | 1,033.2 | 1,123.26 | 1,193.94 | 1,251.2 | 1,341.9 | 1,398.0 | 1,454.9 |
| The density of railways (㎞/1000 ㎢) | 7.457837 | 7.964752 | 9.762196 | 10.07545 | 10.17061 | 10.50941 | 11.13421 | 11.42567 | 11.66386 | 12.63599 |
| The density of highways (㎞/1000 ㎢) | 273.6325 | 294.1819 | 302.7338 | 316.2605 | 320.2638 | 349.5137 | 362.9666 | 373.6875 | 380.7812 | 385.4315 |

Source: Based on table 1.


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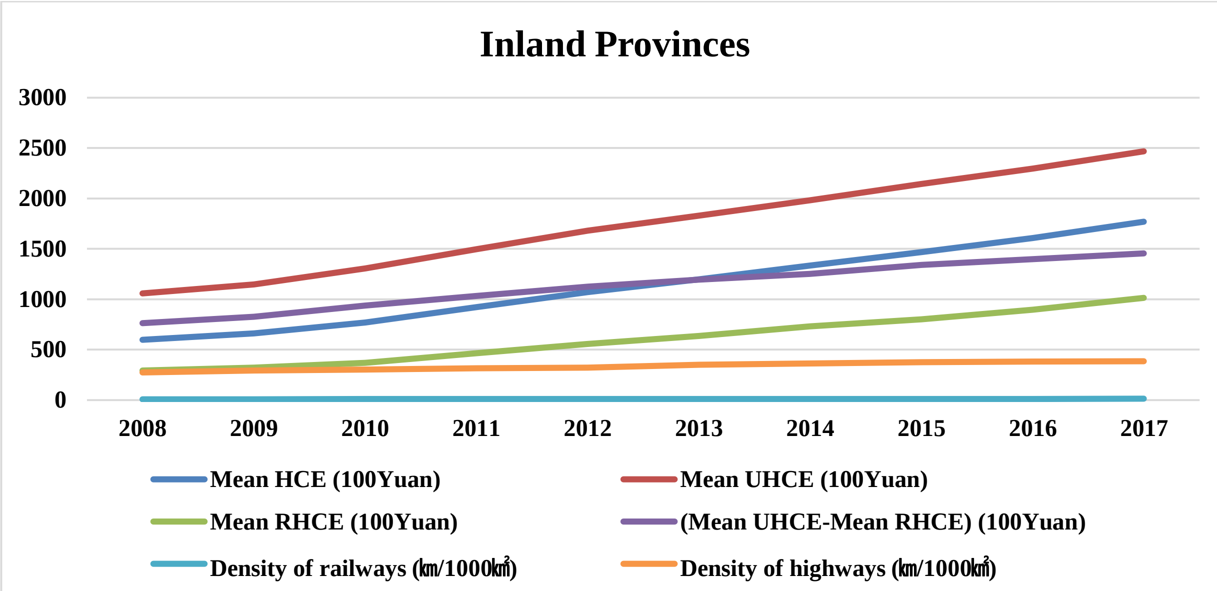


**Fig 3. Graphic description of year-specific averages of HCE, UHCE, RHCE, the difference between UHCE and RHCE, and densities of railways and highways (inland provinces).**

Source: Based on table 3.

**Table 4. Year-specific averages of HCE, UHCE, RHCE, the difference between UHCE and RHCE, and densities of railways and highways (Coastal provinces)**

| Indicator | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean HCE (100Yuan) | 921.05 | 1,006.05 | 1,146.775 | 1,323.875 | 1,478 | 1,606.9 | 1,738.5 | 1,951.725 | 2,132.35 | 2,343.35 |
| Mean UHCE (100Yuan) | 1,380.225 | 1,482.85 | 1,661.025 | 1,856.05 | 2,037.9 | 2,180.675 | 2,279.975 | 2,557.425 | 2,742.025 | 2,959.6 |
| Mean RHCE (100Yuan) | 426.475 | 466.3 | 527.8 | 654.125 | 746.725 | 823.2 | 989.925 | 1,088.45 | 1,229.35 | 1,376.175 |
| (Mean UHCE-Mean RHCE) (100Yuan) | 953.75 | 1,016.55 | 1,133.225 | 1,201.925 | 1,291.175 | 1,357.475 | 1,290.05 | 1,468.975 | 1,512.675 | 1,583.425 |
| The density of railways (㎞/1000 ㎢) | 12.01622 | 13.88341 | 16.38505 | 16.52394 | 16.9358 | 19.5735 | 21.21041 | 24.57365 | 24.95665 | 24.95665 |
| The density of highways (㎞/1000 ㎢) | 672.7374 | 688.2404 | 708.2551 | 727.033 | 750.8522 | 779.768 | 807.4976 | 829.5336 | 848.792 | 873.948 |

Source: Based on table 2.

In figures 3 and 4, it is seen that indicators being interested grow continuously for all inland and coastal provinces. The only exception is the difference between UHCE and RHCE. For a comprehensive comparison of all inland and coastal provinces, calculating indicator-specific total means from tables 5 and 6 and putting them into a graph is as follows (see table 5 and fig. 5).


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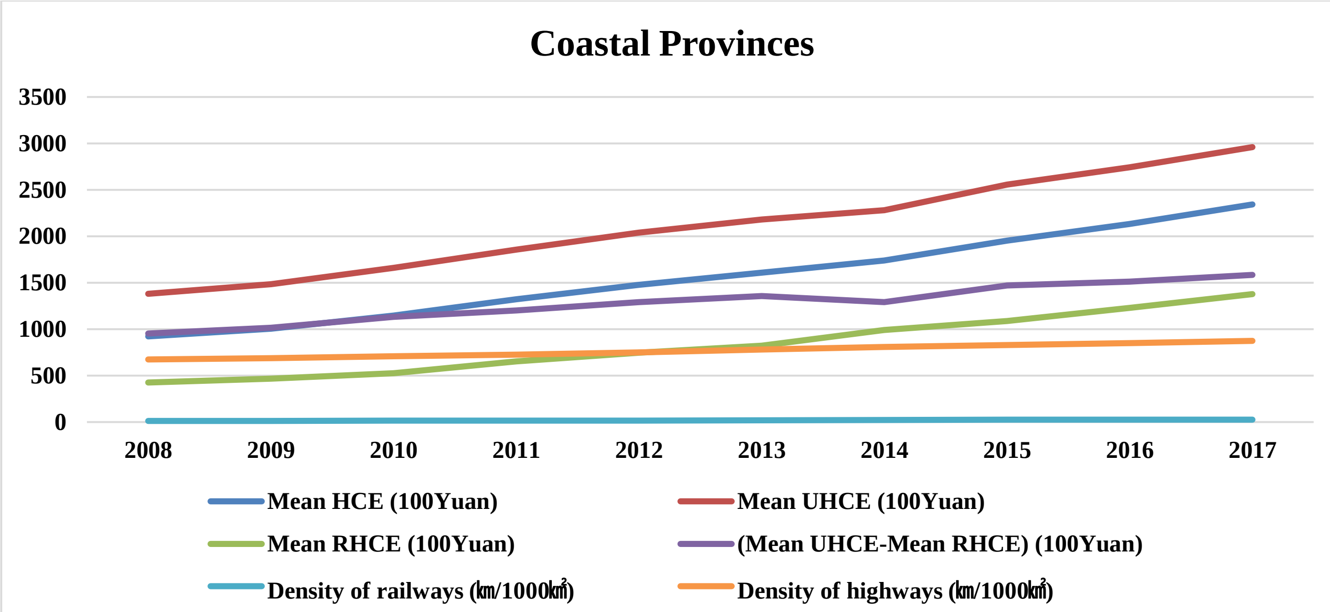


**Fig 4. Graphic description of year-specific averages of HCE, UHCE, RHCE, the difference between UHCE and RHCE, and densities of railways and highways (Coastal provinces)**

Source: Based on table 4.

**Table 5. Comparison of inland with the coastal provinces using indicator-specific total means[a]**

| Indicator | Inland Provinces | Coastal Provinces |
|---|---|---|
| Total mean HCE (100Yuan) | 1,139.058 | 1,564.858 |
| Total mean UHCE (100Yuan) | 1,740.366 | 2,113.775 |
| Total mean RHCE (100Yuan) | 608.282 | 832.8525 |
| (Total mean UHCE- Total mean RHCE) (100Yuan) | 1,132.084 | 1,280.923 |
| The total mean density of railways (㎞/1000 ㎢) | 10.28 | 19.10153 |
| The total mean density of highways (㎞/1000 ㎢) | 335.9453 | 768.6657 |

Source: Based on tables 1 and 2.

Note: [a] Sum (province- and year-specific averages of indicators)/number of years

From figure 5, it is seen that coastal provinces are higher than inland provinces concerning all indicators. In other words, this means that coastal provinces developed compared to inland provinces.

As seen above, it is seen that there are differences in HCE and densities of railways and highways among provinces, and coastal provinces are higher than inland provinces concerning indicators by processing the data, calculating the descriptive statistics, and conducting the graphic description. However, this is significant in showing the changes and features of indicators according to provinces directly and showing the relationship between indicators indirectly, but it has limitations in analyzing the impacts of TI's development level on HCE and the difference between UHCE and RHCE. One of the research focuses of this paper is to analyze the influences of the development level of TI such as railways and highways on HCE and the difference between UHCE and RHCE, and this can be analyzed by correlation and regression analysis methods.


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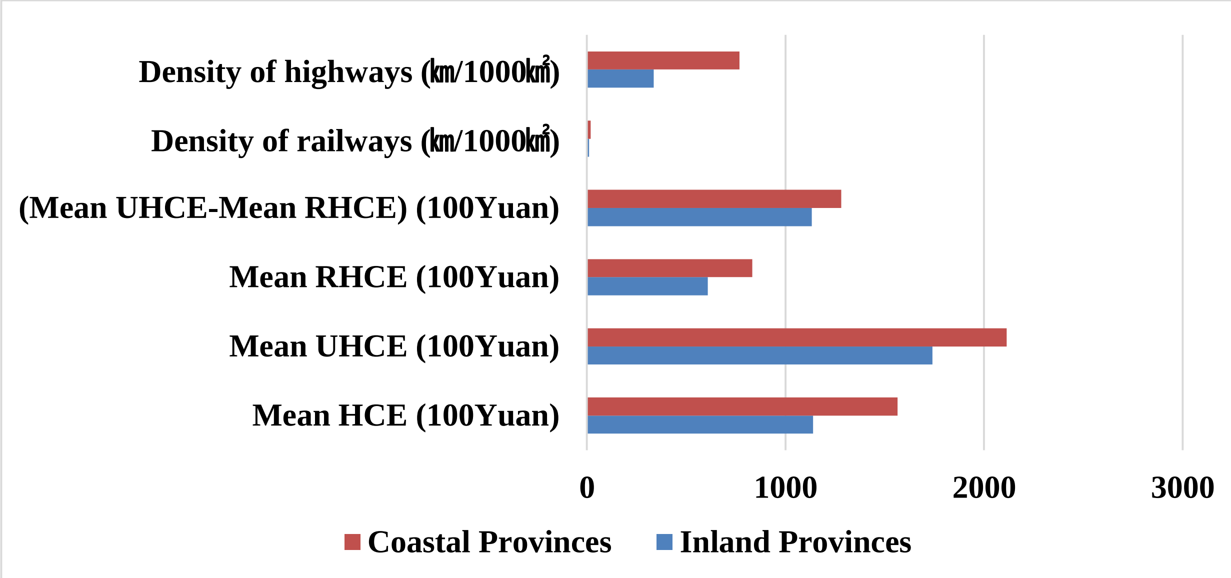


**Fig 5. Comparison of the inland with the coastal provinces using indicator-specific total means.**
Source: Based on table 5.

### 4.2. Correlation and Regression Analysis

To analyze the correlation between indicators, we have selected HCE and the difference between UHCE and RHCE as dependent variables and densities of railways and highways as independent variables. We have conducted the correlation and regression analysis and assessed summarily for all inland and coastal provinces, because to analyze and assess the impacts of independent variables on dependent ones according to individual provinces is complicated in calculation, and the procedures of applying correlation and regression analysis methods are same.

First of all, calculate the correlation coefficients to analyze correlations between indicators for all inland and coastal provinces (see table 6). From table 6, it is seen that while impacts of TI's elements on HCE are relatively weak in inland provinces, their impacts are strong in coastal provinces. Also, the impacts of TI's elements on the difference between UHCE and RHCE are stronger than those on HCE in inland provinces, and the development level of highways has a more significant influence on HCE or the difference between UHCE and RHCE than railways in coastal provinces. Correlation coefficients are statistically significant at the one percent level of significance.

**Table 6. Correlation coefficients[a]**

| Province | Independent / Dependent | Density of railways (㎞/1000 ㎢) | Density of highways (㎞/1000 ㎢) | Correlation between independent variables |
|---|---|---|---|---|
| Inland provinces[b] | HCE (yuan) | .389** | .282* | .916** |
| | UHCE-RHCE (yuan) | .511** | .421** | .916** |
| Coastal provinces[c] | HCE (yuan) | .651** | .833** | .331* |
| | UHCE-RHCE (yuan) | .340* | .740** | .331* |

Note: **: Correlation is significant at the 0.01 level (2-tailed). *: Correlation is significant at the 0.05 level (2-tailed).
[a] Pearson Correlation, [b] number of observations = 50, [c] number of observations = 40.

Next, conduct the regression analysis for all inland and coastal provinces. This aims to analyze and estimate the impacts of the development level of railways and highways on HCE and the difference between UHCE and RHCE for the inland and coastal provinces. The results of the regression analysis are


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described in Appendix A (see Appendix A). As a result, the significance of regression models and equations are tested, and thus, this enables us to analyze and estimate the impacts of densities of railways and highways on HCE and the difference between UHCE and RHCE for all inland and coastal provinces. As a result of regression analysis, regression equations constructed according to dependent variables for all inland and coastal provinces are as follows.

*All inland provinces;*

$$y_1 = 9512.403 + 429.805x_1 - 7.525x_2$$
$$y_2 = 9718.616 + 251.302x_1 - 2.906x_2$$

*All coastal provinces;*

$$y_1 = -8634.371 + 543.241x_1 + 18.091x_2$$
$$y_2 = 2620.789 + 83.661x_1 + 11.176x_2$$

where $y_1$- HCE (Yuan), $y_2$- UHCE – RHCE (Yuan)

$x_1$- density of railways (km/1000km²), $x_2$- density of highways (km/1000km²)

Here we have investigated the relationship between densities of railways, highways, and HCE, or the difference between UHCE and RHCE for the Chinese provinces directly affected by OBOR, and analyzed the impacts of railways and highways on HCE or the difference between UHCE and RHCE using correlation and regression analysis.

First of all, indicator-specific differences among provinces were described by calculating the indicator-specific averages and putting them into graphs. According to these, there are differences between mean HCE, mean difference between UHCE and RHCE (mean UHCE – mean RHCE), and mean densities of railways and highways among the provinces. In other words, consumption expenditures increase or the difference between UHCE and RHCE does not decrease in proportion to the development level of railways and highways according to provinces. The graphic presentation revealed that the above indicators grew continuously for 10 years for the inland and coastal provinces. However, this does not mean that HCE entirely depends on the development level of TI. Also, a graphic description for the inland and coastal provinces using indicator-specific total means is conducted, and this shows that coastal provinces are higher than inland provinces for all indicators. Next, to analyze the impact of TI on HCE, correlation and regression analyses were conducted for all the inland and coastal provinces. Calculated correlation coefficients show that correlations between TI and HCE for inland provinces differ from ones for coastal provinces and that there is a strong correlation between the development level of highways and the difference between UHCE and RHCE in coastal provinces. The results of regression analysis including the contribution of independent variables to dependent variables ($R^2$), regression coefficients, and estimation results differ between inland and coastal provinces (see Appendix A).

## 5. Discussion

Calculating indicator-specific averages and comparing them according to provinces, it is seen that certain tendencies do not exist. In other words, a general conclusion regarding which development of TI has a significant impact on consumption level in the given region is not drawn. While HCE gets higher in proportion to the development level of TI in some provinces, it is not in others. On the contrary, some provinces are relatively higher than others in the development level of TI but are lower in HCE. This enables us to understand the features in the relationship between indicators according to provinces but it does not provide general tendencies.

From this, indicator- and year-specific averages and total means were calculated and put into graphs for all the inland and coastal provinces. It was found that coastal provinces are larger than inland provinces for all indicators. However, the above methods don't show the direct relationship between dependent and independent variables. As a result of correlation analysis is conducted, it is revealed that the impacts of TI on HCE in inland provinces are not significant enough compared to coastal provinces, and TI has a certain


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impact on HCE, but the development level of highways has a significant impact on the difference between UHCE and RHCE in coastal provinces. Based on such correlation, regression analysis was conducted. As a result of regression analysis, it is viewed that in terms of the contribution of independent variables, inland provinces have lower scores than coastal provinces. In other words, contributions of independent variables to the dependent variable (HCE) are relatively higher (.923 and .852). From the results that constructed regression equations based on regression coefficients and conducted estimation, it is seen that deviations between actual and predicted values are not consistent for the provinces. Analysis with regression models shows that while the density of railways has a positive impact on HCE and the difference between UHCE and RHCE in inland provinces, the densities of railways and highways have a positive impact on HCE and the difference between UHCE and RHCE in coastal provinces. Furthermore, it can be seen that while the positive impact of density of railways on the difference between UHCE and RHCE in inland provinces is larger than in coastal provinces, the positive impact of density of railways on HCE in coastal provinces – is larger than in inland provinces.

## 6. Conclusion

In this study, we have calculated the indicators such as HCE, the difference between UHCE and RHCE, and densities of railways and highways and their averages, and have conducted the correlation and regression analyses to reveal the relationship between living standards and TI's elements such as railways and highways in the Chinese provinces directly affected by OBOR. Research problems are as follows; a) Is the living standards enhanced or does the difference between urban and rural regions in living standards decrease in proportion to the development level of railways and highways in given provinces, and b) How do the development levels of railways and highways affect the living standards in given regions? Conclusions from the analysis are summarized as follows. The first conclusion is that living standards are not improved in proportion to the development level of railways and highways due to influences of various factors on living standards in the Chinese provinces directly affected by OBOR. It is from calculation results of the province- and indicator-specific averages. The second is that the development level of TI has not enough influence on reducing the gap in living standards between urban and rural regions in the Chinese provinces directly affected by OBOR. This is concerned with the fact that the higher the development level of TI gets, the larger the gap in living standards between urban and rural regions becomes, except for some cases. The third is that the development level of TI has a relatively more significant impact on living standards, in particular, on HCE in coastal provinces than inland provinces. This is from the calculation of correlation and contribution coefficients of independent variables to dependent ones for all inland and coastal provinces. The fourth is that in the future, the measures to develop the TI provably contribute to achieving targets for enhancing the living standards under the realization of OBOR. This is from estimation results with regression equations.

Certainly, our analysis does not consider the socio-economic and geographic features of individual provinces starting from the purpose of revealing the general tendencies and conclusions. Therefore, in the future, it is necessary to deepen analysis according to individual provinces directly affected by OBOR to take concrete infrastructure-related measures.

**Authors' Contribution:** Gwang-Nam Rim conceived the idea and collected data; Chol-Ju An analyzed the data; Gwang-Nam Rim wrote the paper.

**Conflict of Interest:** The authors declare no conflict of interest.

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## Appendix A: Results of regression analysis

**Table A.1. Model Summary[b]**

| Model | | R | $R^2$ | Adjusted R2 | Standard error of estimate |
|---|---|---|---|---|---|
| Inland | HCE (yuan) | .432[a] | .186 | .152 | 3824.903 |
| | UHCE-RHCE (yuan) | .524[a] | .275 | .244 | 2207.313 |
| Coastal | HCE (yuan) | .923[a] | .852 | .844 | 2572.215 |
| | UHCE-RHCE (yuan) | .747[a] | .557 | .533 | 2705.017 |

Note: [a] Predictors: (Constant), the density of highways (㎞/1000 ㎢), the density of railways (㎞/1000 ㎢), [b] Dependent Variable: HCE (yuan), UHCE-RHCE (yuan),

**Table A.2. ANOVA[b]**

| Model | | | Sum of Squares | Degree of freedom | Mean Square | F | Significance |
|---|---|---|---|---|---|---|---|
| Inland | HCE (yuan) | Regression | 1.574E8 | 2 | 7.871E7 | 5.380 | .008[a] |
| | | Residual | 6.876E8 | 47 | 1.463E7 | | |
| | | Total | 8.450E8 | 49 | | | |
| | UHCE-RHCE (yuan) | Regression | 8.668E7 | 2 | 4.334E7 | 8.896 | .001[a] |
| | | Residual | 2.290E8 | 47 | 4872228.635 | | |
| | | Total | 3.157E8 | 49 | | | |
| Coastal | HCE (yuan) | Regression | 1.408E9 | 2 | 7.041E8 | 106.420 | .000[a] |
| | | Residual | 2.448E8 | 37 | 6616289.576 | | |
| | | Total | 1.653E9 | 39 | | | |
| | UHCE-RHCE (yuan) | Regression | 3.409E8 | 2 | 1.704E8 | 23.293 | .000[a] |
| | | Residual | 2.707E8 | 37 | 7317114.520 | | |
| | | Total | 6.116E8 | 39 | | | |

Note: [a] Predictors: (Constant), the density of highways (㎞/1000 ㎢), the density of railways (㎞/1000 ㎢), [b] Dependent Variable: HCE (yuan), UHCE-RHCE (yuan)


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**Table A.3. Coefficients[a]**

| Model | | | Unstandardized Coefficients | | Standardized Coefficients | t | Significance |
|---|---|---|---|---|---|---|---|
| | | | B | Standard Error | Beta | | |
| Inland | HCE (yuan) | (Constant) | 9,512.403 | 910.434 | | 10.448 | .000 |
| | | The density of railways (km/1000 ㎢) | 429.805 | 173.164 | .815 | 2.482 | .017 |
| | | The density of highways (km/1000 ㎢) | -7.525 | 5.320 | -.464 | -1.414 | .164 |
| | UHCE-RHCE (yuan) | (Constant) | 9,718.616 | 525.402 | | 18.497 | .000 |
| | | The density of railways (km/1000 ㎢) | 251.302 | 99.9317 | . .779 | 2.515 | .015 |
| | | The density of highways (km/1000 ㎢) | -2.906 | 3.070 | -.293 | -.947 | .349 |
| Coastal | HCE (yuan) | (Constant) | -8,634.371 | 1,797.452 | | -4.804 | .000 |
| | | The density of railways (km/1000 ㎢) | 543.241 | 86.4659 | .421 | 6.283 | .000 |
| | | The density of highways (km/1000 ㎢) | 18.091 | 1.748 | .694 | 10.347 | .000 |
| | UHCE-RHCE (yuan) | (Constant) | 2,620.789 | 1,890.253 | | 1.386 | .174 |
| | | The density of railways (km/1000 ㎢) | 83.661 | 90.930 | .107 | .920 | .364 |
| | | The density of highways (km/1000 ㎢) | 11.176 | 1.839 | .704 | 6.078 | .000 |

[a] Dependent Variable: HCE (yuan), UHCE-RHCE (yuan)

**Table A.4. Casewise Diagnostics[a] (Inland provinces)**

| Case Number | Standard. Residual | HCE (Yuan) | Predicted Value | Residual | Standard. Residual | UHCE-RHCE (Yuan) | Predicted Value | Residual |
|---|---|---|---|---|---|---|---|---|
| 1 | -1.288 | 6483 | 11407.63 | -4.925E3 | -1.607 | 8230 | 11778.11 | -3.548E3 |
| 2 | -1.041 | 7154 | 11137.24 | -3.983E3 | -1.286 | 8876 | 11715.16 | -2.839E3 |
| 3 | -1.101 | 8474 | 12685.20 | -4.211E3 | -1.100 | 10217 | 12644.93 | -2.428E3 |
| 4 | -.645 | 10053 | 12520.51 | -2.468E3 | -.483 | 11516 | 12581.31 | -1.065E3 |
| 5 | -.085 | 11852 | 12176.49 | -324.487 | .010 | 12471 | 12448.43 | 22.565 |
| 6 | .142 | 13206 | 12664.56 | 541.438 | .108 | 13000 | 12761.40 | 238.596 |
| 7 | .525 | 14812 | 12804.07 | 2.008E3 | .508 | 13979 | 12856.77 | 1.122E3 |
| 8 | .698 | 15363 | 12694.28 | 2.669E3 | .507 | 13933 | 12814.37 | 1.119E3 |
| 9 | 1.004 | 16657 | 12815.49 | 3.842E3 | .696 | 14438 | 12902.67 | 1.535E3 |
| 10 | 1.282 | 18485 | 13582.16 | 4.903E3 | .948 | 15457 | 13364.72 | 2.092E3 |
| 11 | -1.339 | 4947 | 10068.86 | -5.122E3 | -1.323 | 7495 | 10414.28 | -2.919E3 |


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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12 | -1.153 | 5509 | 9920.41 | -4.411E3 | -1.072 | 7991 | 10356.94 | -2.366E3 |
| 13 | -.941 | 6234 | 9833.82 | -3.600E3 | -.711 | 8755 | 10323.50 | -1.568E3 |
| 14 | -.590 | 7493 | 9749.00 | -2.256E3 | -.314 | 9597 | 10290.73 | -693.732 |
| 15 | -.307 | 8542 | 9717.40 | -1.175E3 | .084 | 10485 | 10298.56 | 186.441 |
| 16 | -.042 | 9616 | 9775.93 | -159.932 | .336 | 11082 | 10341.20 | 740.804 |
| 17 | .046 | 10678 | 10503.94 | 174.064 | .671 | 12264 | 10782.63 | 1.481E3 |
| 18 | .260 | 11868 | 10872.35 | 995.645 | 1.006 | 13225 | 11005.06 | 2.220E3 |
| 19 | .513 | 13086 | 11123.93 | 1.962E3 | 1.443 | 14347 | 11162.32 | 3.185E3 |
| 20 | .643 | 14203 | 11741.94 | 2.461E3 | 1.553 | 14949 | 11521.21 | 3.428E3 |
| 21 | -1.073 | 5830 | 9934.36 | -4.104E3 | -1.535 | 6695 | 10082.33 | -3.387E3 |
| 22 | -.888 | 6501 | 9897.90 | -3.397E3 | -1.204 | 7410 | 10068.25 | -2.658E3 |
| 23 | -.698 | 7326 | 9995.03 | -2.669E3 | -.951 | 8030 | 10129.38 | -2.099E3 |
| 24 | -.321 | 8744 | 9973.15 | -1.229E3 | -.760 | 8443 | 10120.93 | -1.678E3 |
| 25 | .087 | 10289 | 9955.44 | 333.556 | -.546 | 8910 | 10114.09 | -1.204E3 |
| 26 | .564 | 12070 | 9912.73 | 2.157E3 | .256 | 10663 | 10097.60 | 565.404 |
| 27 | .923 | 13534 | 10004.66 | 3.529E3 | .493 | 11245 | 10156.72 | 1.088E3 |
| 28 | 1.326 | 15167 | 10093.46 | 5.074E3 | .858 | 12108 | 10214.63 | 1.893E3 |
| 29 | 1.749 | 16751 | 10062.20 | 6.689E3 | .930 | 12256 | 10202.56 | 2.053E3 |
| 30 | 2.087 | 18020 | 10038.24 | 7.982E3 | .707 | 11753 | 10193.31 | 1.560E3 |
| 31 | -1.360 | 7108 | 12311.02 | -5.203E3 | -1.486 | 8547 | 11827.17 | -3.280E3 |
| 32 | -1.294 | 7918 | 12867.66 | -4.950E3 | -1.160 | 9610 | 12170.62 | -2.561E3 |
| 33 | -1.500 | 8992 | 14730.23 | -5.738E3 | -1.106 | 10834 | 13275.38 | -2.441E3 |
| 34 | -1.102 | 10937 | 15150.88 | -4.214E3 | -.738 | 11938 | 13566.31 | -1.628E3 |
| 35 | -.733 | 12120 | 14924.24 | -2.804E3 | -.550 | 12265 | 13478.77 | -1.214E3 |
| 36 | -.300 | 13537 | 14686.26 | -1.149E3 | -.352 | 12609 | 13386.85 | -777.848 |
| 37 | .212 | 15193 | 14380.29 | 812.708 | -.231 | 12758 | 13268.67 | -510.667 |
| 38 | .796 | 17210 | 14164.98 | 3.045E3 | .818 | 14991 | 13185.50 | 1.805E3 |
| 39 | 1.172 | 18570 | 14085.65 | 4.484E3 | 1.019 | 15404 | 13154.86 | 2.249E3 |
| 40 | 1.674 | 21058 | 14653.63 | 6.404E3 | 1.100 | 15931 | 13502.69 | 2.428E3 |
| 41 | -1.059 | 5521 | 9572.40 | -4.051E3 | -1.219 | 7196 | 9885.65 | -2.690E3 |
| 42 | -1.005 | 5945 | 9787.30 | -3.842E3 | -1.213 | 7337 | 10014.90 | -2.678E3 |
| 43 | -.656 | 7400 | 9907.24 | -2.507E3 | -.496 | 8991 | 10086.91 | -1.096E3 |


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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 44 | -.269 | 8895 | 9922.25 | -1.027E3 | .032 | 10168 | 10097.85 | 70.149 |
| 45 | .182 | 10675 | 9977.32 | 697.682 | .857 | 12032 | 10139.67 | 1.892E3 |
| 46 | .377 | 11401 | 9957.83 | 1.443E3 | 1.002 | 12343 | 10132.14 | 2.211E3 |
| 47 | .600 | 12435 | 10140.94 | 2.294E3 | .939 | 12317 | 10243.97 | 2.073E3 |
| 48 | .903 | 13684 | 10231.81 | 3.452E3 | 1.150 | 12838 | 10299.63 | 2.538E3 |
| 49 | 1.316 | 15247 | 10214.59 | 5.032E3 | 1.433 | 13456 | 10292.97 | 3.163E3 |
| 50 | 1.709 | 16736 | 10200.08 | 6.536E3 | 1.980 | 14657 | 10287.37 | 4.370E3 |

[a] Dependent Variable: HCE (yuan), UHCE-RHCE (yuan)

Source: Own calculation

## Table A.4. Casewise Diagnostics[a] (Coastal provinces)

| Case Number | Standard. Residual | HCE (Yuan) | Predicted Value | Residual | Standard. Residual | UHCE-RHCE (Yuan) | Predicted Value | Residual |
|---|---|---|---|---|---|---|---|---|
| 1 | -.421 | 10645 | 11728.73 | -1.084E3 | -.968 | 9261 | 11879.65 | -2.619E3 |
| 2 | -1.075 | 11336 | 14100.25 | -2.764E3 | -1.070 | 9414 | 12307.06 | -2.893E3 |
| 3 | -.442 | 13187 | 14323.79 | -1.137E3 | -.634 | 10731 | 12445.15 | -1.714E3 |
| 4 | .171 | 14958 | 14517.52 | 440.483 | -.458 | 11326 | 12564.82 | -1.239E3 |
| 5 | .145 | 16144 | 15770.13 | 373.868 | -.665 | 11126 | 12923.59 | -1.798E3 |
| 6 | -.451 | 17115 | 18275.36 | -1.160E3 | -.763 | 11578 | 13641.11 | -2.063E3 |
| 7 | .048 | 19099 | 18976.18 | 122.820 | -.788 | 11734 | 13866.52 | -2.133E3 |
| 8 | -.173 | 20828 | 21272.78 | -444.777 | -1.066 | 11571 | 14455.17 | -2.884E3 |
| 9 | .682 | 23355 | 21600.63 | 1.754E3 | -.906 | 12206 | 14657.70 | -2.452E3 |
| 10 | 1.629 | 25969 | 21779.45 | 4.190E3 | -.806 | 12589 | 14768.17 | -2.179E3 |
| 11 | -.975 | 13911 | 16418.24 | -2.507E3 | -.330 | 14126 | 15017.70 | -891.702 |
| 12 | -.879 | 15243 | 17504.55 | -2.262E3 | .019 | 15319 | 15268.89 | 50.107 |
| 13 | -.548 | 17211 | 18620.74 | -1.410E3 | .453 | 16904 | 15678.49 | 1.226E3 |
| 14 | .231 | 19578 | 18982.85 | 595.154 | .706 | 17673 | 15762.23 | 1.911E3 |
| 15 | .940 | 21823 | 19404.98 | 2.418E3 | 1.238 | 19371 | 16022.99 | 3.348E3 |
| 16 | .551 | 23739 | 22321.64 | 1.417E3 | 1.361 | 20526 | 16845.04 | 3.681E3 |
| 17 | -.067 | 24582 | 24755.31 | -173.313 | -.039 | 17542 | 17648.63 | -106.632 |
| 18 | .473 | 26365 | 25147.29 | 1.218E3 | .428 | 19049 | 17890.77 | 1.158E3 |
| 19 | .985 | 28495 | 25961.96 | 2.533E3 | .654 | 19883 | 18114.11 | 1.769E3 |
| 20 | 1.808 | 30762 | 26112.72 | 4.649E3 | 1.149 | 21314 | 18207.24 | 3.107E3 |
| 21 | .409 | 6152 | 5099.73 | 1.052E3 | -.058 | 8086 | 8242.14 | -156.137 |
| 22 | .335 | 6968 | 6105.65 | 862.350 | .267 | 9161 | 8439.42 | 721.577 |


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|---|---|---|---|---|---|---|---|---|
| 23 | .578 | 7920 | 6433.27 | 1.487E3 | .606 | 10175 | 8535.78 | 1.639E3 |
| 24 | .976 | 9181 | 6669.31 | 2.512E3 | .861 | 11010 | 8681.59 | 2.328E3 |
| 25 | 1.408 | 10519 | 6897.74 | 3.621E3 | 1.212 | 12102 | 8822.70 | 3.279E3 |
| 26 | 1.056 | 11710 | 8993.33 | 2.717E3 | 1.523 | 13390 | 9269.01 | 4.121E3 |
| 27 | .810 | 12944 | 10860.28 | 2.084E3 | 1.550 | 13874 | 9680.11 | 4.194E3 |
| 28 | .718 | 13857 | 12010.87 | 1.846E3 | 1.357 | 13637 | 9966.77 | 3.670E3 |
| 29 | 1.004 | 15013 | 12429.86 | 2.583E3 | 1.533 | 14266 | 10119.57 | 4.146E3 |
| 30 | 1.330 | 16064 | 12643.06 | 3.421E3 | 1.238 | 13599 | 10251.27 | 3.348E3 |
| 31 | -.340 | 6134 | 7009.58 | -875.579 | -1.021 | 6677 | 9438.09 | -2.761E3 |
| 32 | -.400 | 6695 | 7725.06 | -1.030E3 | -1.150 | 6768 | 9880.07 | -3.112E3 |
| 33 | -2.095 | 7553 | 12942.06 | -5.389E3 | -1.275 | 7519 | 10967.90 | -3.449E3 |
| 34 | -1.778 | 9238 | 13810.85 | -4.573E3 | -1.270 | 8068 | 11504.58 | -3.437E3 |
| 35 | -1.513 | 10634 | 14526.33 | -3.892E3 | -1.072 | 9048 | 11946.56 | -2.899E3 |
| 36 | -1.213 | 11712 | 14832.96 | -3.121E3 | -1.231 | 8805 | 12135.98 | -3.331E3 |
| 37 | -.964 | 12915 | 15395.13 | -2.480E3 | -1.490 | 8452 | 12483.25 | -4.031E3 |
| 38 | -1.337 | 17019 | 20458.81 | -3.440E3 | .379 | 14502 | 13476.37 | 1.026E3 |
| 39 | -1.047 | 18431 | 21123.18 | -2.692E3 | .098 | 14152 | 13886.77 | 265.226 |
| 40 | -.568 | 20939 | 22400.82 | -1.462E3 | .428 | 15835 | 14676.02 | 1.159E3 |

[a] Dependent Variable: HCE (yuan), UHCE-RHCE (yuan)
Source: Own calculation