Transportation Infrastructure Facilities and the Total Factor Productivity of "the New Silk Road"

- *Spatial Econometrics Analysis on Panel Data*

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Abstract：This thesis used panel data to establish empirical model approach to analyze the relationship between transportation infrastructure facilities and the total factor productivity growth which based on the 17 important cities which covered by the East and West traffic artery of Long-Hai and Lan-Xin railways along the New Silk Road. The empirical result proved that: transportation infrastructure facilities have a significant positive impact on the total factor productivity growth; also, railway and highways of higher class have a spatial spillover effect on the total factor productivity growth to the extent of 74.59%, the contribution share of all kinds of transportation is 59.0872%. In addition, the railway and freeway have a significant positive effect on the total factor productivity growth.

Key words: the New Silk Road; transportation infrastructure; the total factor productivity; spatial spillover effect

1. The Issues Rose and the Review of Related Scientific Literatures

1.1 The Issues Rose

The Silk Road, a historical international route, made an important contribution to humans' economical and cultural exchanges. It is the artery that associates China with the Asia and Europe. The Silk Road occupies an important position in the history development of the world. The New Silk Road refers to the Eurasian Continental Bridge, which is a conception raised in the new era. From the East to the West, it includes *Long-Hai* line and *Lan-Xin* line. The new Silk Road links a prosperous economic zone in East Asia in the east and the developed European economic zone in the west. In 21st century, compared with other channels, this section has been ignored for a long time, which had been very brilliant in the history. Many inland cities are located in western area of less developed economy in China. There is a big gap of *GDP* per capita in these cities compared with other cities in China, although these cities boast prosperous history, and they are rich in mineral resources, energy resources, land resources and human resources and also valuable tourism resources that consist of many historical heritages, magnificent natural sceneries of multinational culture. Thus, an economical depression belt appeared between China and central-Asia. In order to solve these problems, the Chinese Party Central Committee proposed economical strategies in a timely manner, for example, “the Western development”, “the rise of central China”, “Guanzhong-Tianshui economic area” and so on. [1]

In recent years, the infrastructure of “the new Silk Road” transportation along the China-Central Asia has be improved a lot, thanks to efforts of China, Central Asian countries and relevant international organizations. Emergence of new cities and changes in conditions of modern land transportation has created an opportunity for the development of the new Silk Road. The research on transportation infrastructure investment around “the New Silk Road” economic zone and total factor productivity growth can help us to know the contribution rate of total factor productivity growth by different types of transportation infrastructure investment, also the spatial spillover effect. Meanwhile, it will provide certain practical significance and reference on decision-making of the Western development, revitalization of the Silk Road, formation of the great international passage by connecting Eurasia Bridge.

1.2 Review of Related Literature

In the 1940s, the positive impact of infrastructure on economic growth caused general concern from development economists, represented by *Rosenstein Rodan*, *Ragnar Nurkse, Walt Rostow* and *Albert Hirschman*, they analyzed the impact of transport infrastructure on economic growth from the perspective of different theories. Under the impetus of the World Bank, *Aschauer* (1989) [2] started to study the relationship between economic growth and infrastructure for econometric studies. Later on, *Holta-Eakin* (1994) [3], *Barro* (1995) [4], also separate the infrastructure from the total investment; estimate the impact of infrastructure capital to economic growth separately by using the method of production function. Scholars represented by *Aschauer*（1989）[2]、*Munnell*（1990）[5]、*Hulten*，*Schwab*（1991）[6]、*Merriman*（1990）[7]、*Christodoulakis*（1993）[8]、*Wylie*（1995）[9]、*Denny*，*Kevin*（1997）[10]、*Everaert*，*Heylen*（2001）[11]use the part of the production function method, to work out the considerable flexibility by using time series data. For a more accurate analysis of relationship between infrastructure capital investment and output, *Munnell* (1990) [5], *Moonaw,Williams* (1991) [12], *Garlino,Voith* (1992) [13], *Evans,Karras* (1994), [14]*Nourzad,Vrieze* (1995) [15], *Picci* (1995) [16], *Prud,Homme* (1996)[17], *Garcia-Mila,McGuire,Porter*(1996)[18],*Kelejian,Robinson*(1997)[19],*Bonaglia,Ferrara* (2000)[20] Panel sample data, such as empirical research that Infrastructure using panel data at the State level of output elasticity than the general use of infrastructure at the national level time series data output flexibility is much smaller, the reason for this may be the infrastructure in the counties between the positive spillover effects in the model are ignored. *Holtz-Eakin*[3] and *Schwartz* (1995) the first spatial weight matrix, joining in the traditional production function the adjoining infrastructure variables, study the spillover effects on infrastructure, *Boarnet* (1998)[21]and *Schwartz* (1995) on the basis of the *Holtz-Eakin* and *Schwartz* (1995) modeling, found the road infrastructure for economic growth there was a negative spillover effect of the evidence. Foundation facilities of Agent variable selection is divided into two class: one was follow new classical of capital concept, to currency forms of page to said, is now was most related literature by used; the other was on new classical of “technology relationship” be restore, to real form to said, this method of research since in the late 1990 of the 20th century began constantly mature, to *Sanchz-Robles* (1998) [22], *Fernald* (1999) [23], *Canning& Pedroni* (1999) [24] and *Li Ching*, a family tracing peak (2006) [25], *Wang Ren-fei* and *Wang Jin-jie* (2007) [26], *Zhang Xue-liang* (2009) [27], *Liu Bing-lian*, *Wu Peng*, *Liu Yu-hai* (2010) [28], and so on.

At present, looking from the domestic and foreign literature which may consult, very little the relations which grows using the spatial kneading board gauging device research transportation infrastructure and the entire essential factor productivity, nobody is more right the relations which “the new Silk Road” the economical belt's transportation infrastructure and the entire essential factor productivity grow. In view of this, this article uses the establishment kneading board data model the real diagnosis method, takes east China, west transportation aorta *Long-hai*, the *Lanzhou-Xinjiang* line to cover the new Silk Road most important 17 cities to take the samples along the route, between analyzes this economy to take to bring with the transportation infrastructure and the entire essential factor productivity grows the relations.

2. An Empirical Model

2.1Calculation of Total Factor Productivity

1) Data Select

There are 17 cities of great importance which was selected from *Ri-zhao* city Shandong Province in the east, till to *Urumqi* city in *Xin-jiang* in the East, (from West to East they are: *Urumqi*, *Zhang-ye*, *Wu-wei*, *Xi-ning*, *Yin-chuan*, *Lan-zhou*, *Tian-shui*, *Bao-ji*, *Xian-yang*, *Xian*, *Wei-nan*, *Sanmen-xia*, *Luo-yang*, *Zheng-zhou*, *Shang-qiu*, *Ji-nan*, and *sunshine*), all of them were covered by two major railways covered by the new Silk Road, the time span from 2001-2008, Output variables is presented by *GDP*, Input variables including material capital and practitioners. *Zhang June* (2004) [29] calculation will be used in the Physical capital, and shrink swell will be done on *GDP* and material capital follows constant prices in 2000 years.

2) Model and Calculation Results

To set the function of national production of "the New Silk Road" traffic economic belt as stochastic frontier production function form of Douglas production function model:

$$\ln GDP_{it} = \alpha_0 + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \alpha_3 t + (\upsilon_{it} - \mu_{it})$$

$$\mu_{it} = \left\{ \mu i \exp\left[\eta (t - T) \right] \right\} \sim iidN^+(\mu, \quad \sigma_\mu^2) \qquad (1)$$

The left side of the equation was explained variable for *GDP*, the right one including explained variable substances capital *K* and labor number *L*, α_0—α_3 are assessment parameter; i is sample mark, t is sample observation period, T is sample base period annual, υ_i is random interference item, which obeys normal distribution, μ_i is technology without efficiency item, which obey zero points truncated of half normal distribution, μ is expectations under non-truncated normal distribution conditions. η is time-varying parameter technology efficiency Shi. Using the *Frontier* 4.0 software, the results are shown in table 1.

Table 1: function model to estimate of "the New Silk Road" economic production

Variables	*Coefficient*	*Estimated value*	t *Statistics*
The intercept	α_0	1.1234***	7.0716
$\ln K$	α_1	0.5074***	22.215
$\ln L$	α_2	0.3898***	19.2031
t	α_3	0.0211***	7.5324
σ^2		0.0544***	15.6554
υ		0.9627***	181.0061
μ		0.4568***	6.169
η		0.0008***	2.8986
Log *Likelihood function value*		341.4651	
technical inefficiency of non-exist values of testing value of LR		445.02312	

Note: *** indicates1% the significance level.

From the testing results, the estimated parameters are passed test of 1% significance level. Also, υ values of is 0.9627, it means that there is an obvious representation model of composite structure, technical inefficiency of non-exist values of testing value of LR shows using stochastic frontier model reflect “the New Silk Road” of the production function of the national economy more effectively. According to the estimated results of Table 1, the factor productivity (TFP) of traffic economic belt along “the new Silk Road” should be as follows by calculation (2)

$$TFP_{it} = \exp(\alpha_0 + \alpha_{3t}) TE_{it} \qquad (2)$$

$\exp(\alpha_0 + \alpha_{3t})$ In the equation (2) stands for frontier skills of technical levels of t period. TE_{it} Is the number i city’s efficiency in the period of t. According to calculations, during 2001-2008, an annual increase of “the New Silk Road” transport economic total factor productivity is 3.193%, relative to its average annual economic growth rate of 12.19%, a contribution rate is 26.19%.

2.2 Spatial Econometric Model

1) Spatial Econometric Model

Considering the correlation of model errors in space, the establishment of spatial error model (SEM) may lead to spatial correlation When spatial dependence is very important for models. Thus, model (SLM) should be established:

SEM Model:

$$GDP_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j X_{itj} + \varepsilon_{it}$$

$$\varepsilon_{it} = \lambda W \varepsilon_{it} + \mu_{it}$$

$$\mu_{it} \sim N(0,\ \sigma^2 I) \qquad (3)$$

SLM Model：

$$GDP_{it} = \alpha_0 + \rho W Y_{it} + \sum_{j=1}^{n} \alpha_j X_{itj} + \varepsilon_{it}$$

$$\varepsilon_{it} \sim N(0,\ \sigma^2 I) \qquad (4)$$

In the equation (3) and the equation (4), GDP is the dependent variables, X_j is arguments, ε_{it} and μ_{it} are normal distribution of the random error term, α_0 is intercept, α_j、ρ、λ are coefficients, W is the spatial weight matrix, adjacent to first-order function of the distance matrix representation of the adjacent city assigned the value 1, otherwise, the value 0. Due to space model, X_j has the partial effect on GDP which reflected in the space on the exterior, which will fade as the circles spreading, i in the equation (5) and the equation (6) indicate that an external on a district Center in scale out circles of ordinal numbers, to build space external effects models are:

$$\alpha_j \sum_{i=1}^{\infty} \lambda^i = \frac{\alpha_j \lambda}{1-\lambda} \qquad (5)$$

X_j Variables for the *GDP* on the overall effect model are:

$$\alpha_j \sum_{i=0}^{\infty} \lambda^i = \frac{\alpha_j}{1-\lambda} \qquad (6)$$

2) Spatial Correlation Test

Moran indices of Spatial autocorrelation is generally used for inspection of spatial correlation of economic variables, from the calculated of Stata10.0 software, in 2001-2008, for “the New Silk Road” total factor productivity of traffic economic area, Moran Spatial autocorrelation test results (table 2) shows: in years of 2001-2008 Moran *I* had passed 1% significance level test, all are positive ones, and the value increasing year by year, which indicating that there is a clear positive correlation in space for “the new Silk Road” Traffic economic belt of total factor productivity, that is spatial agglomeration phenomena.[28]

Table 2: total factor productivity Moran *I* spatial autocorrelation test of “the New Silk Road” traffic economic belt

Year	The value of *I*	Year	The value of *I*
2001	0.3421*** (3.1872)	2005	0.3541*** (3.2122)
2002	0.3454*** (3.2010)	2006	0.3551*** (3.2234)
2003	0.3457*** (3.2018)	2007	0.3554*** (3.2312)
2004	0.3519*** (3.2114)	2008	0.3556*** (3.2325)

Note: *** indicates 1% significance level.

2.3 Model Check of Transportation Infrastructure and Total Factor Productivity Growth

1) Variables Select and Model

Two indexes were selected for the transportation infrastructure: take every square kilometer of operating railway mileage as the density of railway (X_1), and every square kilometer of highway traffic mileage as a highway density of (X_2). And according to the road classification, Roads can be divided into Expressway (X_{2-0}), highway (X_{2-1}), the secondary road (X_{2-2}), three-level Highway (X_{2-3}), the four-class road (X_{2-4}) and substandard Highway (X_{2-5}). Take the right 17 cities as samples, the time span for the 2001-2008. Take two control variables of non-agricultural production ($Non-agr$) and per capita levels of education indicator variable（Edu）descriptive statistics as shown in table 3. to build the model(1) to analyze the relationship between two indexes on density of railway and highway and total factor productivity, the model (2) of the relationship between roads and total factor productivity.

Table 3: the variable statistics of “the New Silk Road” traffic economic belt

Variables	*Sample number*	*Average*	*Std*	*Min*	*Max*
TFP	136	1.8987	0.6143	0.8701	8.8245
X_1	136	17.5741	15.1368	1.5154	70.6589
X_2	136	420.5641	309.8945	19.4687	1759.4261
X_{2-0}	136	9.0124	13.2753	0.0000	100.1275
X_{2-1}	136	9.8967	15.1215	0.0000	73.5982
X_{2-2}	136	53.1243	57.9784	1.4785	423.2595
X_{2-3}	136	73.2881	73.5841	6.6059	418.6580
X_{2-4}	136	208.9435	172.9845	8.2948	948.7893
X_{2-5}	136	66.5683	84.8924	0.0000	515.9041

2) Model estimation

According to test results from the model (table 4), *SLM* data models of area point double stationary panel should be selected. Also, from the view of value $Log-Likelihood$, *SLM* area point double fixed of panel data model obviously better than traditional panel data and other spatial space Panel model, what’s more, R^2 value is very high in area point double fixed of panel *SLM* data model (1), and (2), therefore, either from statistics inspection or from economic significance view, area point double fixed of panel data model is the priority.

In the double fixed point panel *SLM* data model (1), the explanatory variables pass the 1% of the significant level test, estimation of coefficient of railway density, road density is positive, the transportation infrastructure for growth has a catalytic role in highway density coefficient is smaller. In double fixed point panel *SLM* data model (2), effects on four-level highways, substandard highway on *TFP* growth effect are not obvious, and other explanatory variables estimation coefficient surpass 10% significance level test, its value is positive, railway and highway facilities on the *TFP* growth effect of higher level significantly.

Table 4: the spatial statistical results and total factor productivity growth of “the New Silk Road” transportation infrastructure

variables	*Traditional individual fixed effect*	*panel SEM data models*			*panel SLM data models*		
		The area is fixed	*The time is fixed*	*Double fixed*	*The area is fixed*	*The time is fixed*	*Double fixed*
				Model（1）			
$\ln X_1$	0.05785***	0.0012	-0.0172***	0.0138***	0.0065***	-0.0148***	0.0075***
	（2.2014）	（1.2457）	（-5.6981）	（4.0521）	（3.5511）	（-5.6347）	(4.2029)
$\ln X_2$	0.05121***	0.0001***	0.0000***	0.0001***	0.0001***	0.0004***	0.0001***
	（5.3845）	（3.5015）	（4.7892）	（6.2685）	（4.6112）	（6.07921）	（4.8568）
$Non-agr$	0.0201***	-0.0081***	0.0418***	0.0368***	0.0117***	0.0373***	0.0125***

	（10.2547）	（-6.3641）	（11.1094）	（11.4431）	（5.3791）	（9.024）	（7.9594）
Edu	0.0620^{***}	-0.0063	0.3658^{***}	0.1357^{***}	0.0551^{***}	0.3810^{***}	0.0509^{***}
	（6.5548）	（-1.0932）	（9.5012）	（7.8624）	（5.0491）	（9.4021）	（5.8057）
$W\varepsilon_{it}$		0.9578^{***}	0.5192^{***}	0.4287^{***}			
		（123.3654）	（7.9441）	（5.9130）			
$W\ln TFP$					0.6157^{***}	0.1327^{***}	0.6438^{***}
					（14.3498）	（2.1046）	（79.9754）
R^2	0.9934	0.9993	0.7685	0.9898	0.9976	0.7290	0.9975
$Log-Likelihood$	461.07	497.89	-52.73	287.71	420.79	-58.84	-679.61
				Model（2）			
$\ln X_1$	0.0358^{*}	0.0073^{**}	-0.0735^{**}	0.0383^{**}	0.0115^{*}	-0.0764^{**}	0.0129^{**}
	（1.7219）	（2.0781）	（-2.491）	（20.9041）	（1.8914）	（-2.5771）	（2.1146）
$\ln X_{2-0}$	0.0175^{***}	-0.0009	-0.0630^{***}	0.0197^{***}	0.0046^{***}	-0.0635^{***}	0.0058^{***}
	（3.5894）	（-1.0892）	（-3.4321）	（4.6638）	（3.3864）	（-3.453）	（4.2918）
$\ln X_{2-1}$	0.0111^{*}	-0.0029^{***}	0.0945^{***}	0.0112^{**}	0.0014	0.0897^{***}	0.0030^{*}
	（1.7913）	（-2.6671）	（7.3054）	（2.1167）	（0.8372）	（7.0124）	（1.7375）
$\ln X_{2-2}$	0.1309^{***}	-0.0071^{*}	0.1621^{***}	0.1131^{***}	0.0261^{***}	0.1568^{***}	0.0221^{***}
	（7.0614）	（-1.8002）	（5.6514）	（6.7124）	（4.3615）	（5.3912）	（4.0257）
$\ln X_{2-3}$	0.0535^{***}	-0.0008	-0.0778^{**}	0.6375^{***}	0.0094^{*}	-0.0753^{**}	0.0106^{*}
	（2.7089）	（-0.2383）	（-2.5081）	（3.5748）	（1.6682）	（-2.4471）	（1.9098）
$\ln X_{2-4}$	0.0097	-0.0003	-0.0112	0.0241^{***}	0.0004	-0.0084	0.0027
	（1.2407）	（-0.0861）	（-0.3721）	（3.2914）	（0.2116）	（-0.3052）	（1.2458）
$\ln X_{2-5}$	0.0045^{*}	0.0002	0.0204^{**}	0.0016	0.0014^{**}	0.0196^{**}	0.0009
	（1.9359）	（0.3019）	（2.3089）	（0.8504）	（2.2087）	（2.2256）	（1.4501）
$Non-agr$	0.0100^{***}	0.0023^{***}	0.0092^{***}	0.0086^{***}	0.0037^{***}	0.0094^{***}	0.0035^{***}
	（5.5612）	（7.0925）	（4.5815）	（5.6512）	（7.0624）	（4.6915）	（7.0695）
Edu	0.0281^{***}	0.0036^{***}	0.1306^{***}	0.0280^{***}	0.0086^{***}	0.1282^{***}	0.0091^{***}
	（3.5739）	（2.6864）	（7.9782）	（4.3118）	（3.7136）	（7.8143）	（4.3291）
$W\varepsilon_{it}$		0.9876^{***}	-0.0491	0.2876^{***}			
		（328.1213）	（-0.5043）	（3.5354）			
$W\ln TFP$					0.7446^{***}	0.0758	0.7428^{***}
					（33.4321）	（1.1776）	(79.9781)
R^2	0.9954	0.9997	0.7585	0.9952	0.9996	0.7653	0.9996
$Log-Likelihood$	518.29	786.68	104.82	519.04	733.15	106.76	-6522.69

Note: *** indicates 1% significance level, ** indicates 5% significance level, * indicates 10% significance level.

Through type (5), and (6) the calculation of area point double fixed of panel SLM data model (2), in the coefficient more significantly of various traffic Foundation facilities partial effect and proportion (table 5), the results are shown: railway, and grade higher of traffic Foundation facilities on growth of space external partial effect accounted for TFP overall partial effect of 74.59%, among which, the space external partial effect of the second-level highway is the biggest, when its investment increased 1% each , the TFP growth will be 0.0866%; following by respectively is railway, and three level Highway, and Expressway and the level Highway, external effects and overall effects of highway space on *TFP* growth is least obvious.

Table 5: All kinds of transport infrastructure in total factor productivity growth effect of “the New Silk Road”

variables	*Overall leaning effect*	*Direct leaning effect*		*Outside space leaning effect*	
		flexible	*Proportion %*	*flexible*	*Proportion %*
$\ln X_1$	0.0502	0.0128	25.41	0.0374	74.59
$\ln X_{2-0}$	0.0231	0.0059		0.0172	
$\ln X_{2-1}$	0.0119	0.0030		0.0089	
$\ln X_{2-2}$	0.0866	0.0221		0.0645	
$\ln X_{2-3}$	0.0423	0.0107		0.0316	

Due to various stock of transportation infrastructure, there will be inevitable deviation that judge contribution size of all variables to the growth of *TFP* with elasticity. Therefore, specific calculation is needed to judge the contribution rate of various traffic foundation facilities of “the New Silk Road” on full elements productivity growth. The increase of various traffic foundation facilities stock of “the New Silk Road” boasts a contribution share of 59.0872%on growth of *TFP* (table 6). Among them, secondary roads boasts the highest rate of *TFP* growth, accounting for 23.9859%, followed the highway, railway, and roads of lower levels do the contribution to *TFP* growth rate is very low. [28]

Table 6: the transport infrastructure contribution to total factor productivity growth rate of “the New Silk Road”

transportation infrastructure	*The growth rate %*	*The growth rate of TFP %*	*The Contribution rate to TFP growth %*
railway	10.47	0.5293	2.8281
highway	177.33	4.1327	22.0587
Arterial road	98.62	1.1904	6.3658
Secondary road	51.76	4.4896	23.9859
Tertiary highway	17.01	0.7198	3.8487
Total	-	11.0618	59.0872

According to the statistical data of 2001-2008, estimated results of the Panel *SLM* model, of which “the New Silk Road” traffic Foundation facilities and full elements productivity growth relationship, table 7 shows that: in model (1)and (2), in the year of 2001-2008 railway density has a continuous and significant effect on the full elements productivity growth; in the year of 2001-2004 of Highway density of model (1), the effect is continuous and significant, but that not so obvious in the year of 2005-2008. In model (2), highway density in two periods affects the total factor productivity growth obviously, while others are not.

Table7: Transport infrastructure and norm estimates of total factor productivity growth results of “the New Silk Road”

variables	*Years of* 2001-2004		*Years of* 2005-2008	
	model（1）	*model*（2）	*model*（1）	*model*（2）
$\ln X_1$	0.0126***	0.0090***	0.0113***	0.0130***
	（3.6476）	（2.6389）	（3.3067）	（4.3632）
$\ln X_2$	0.0109***		0.0006	
	（4.4281）		（0.5849）	
$\ln X_{2-0}$		0.0017***		0.0151***
		（2.8793）		（6.2012）
$\ln X_{2-1}$		0.0489***		-0.0008
		（3.3756）		（-0.7653）
$\ln X_{2-2}$		0.0112***		-0.0044
		（3.4275）		（-1.1483）
$\ln X_{2-3}$		0.0079***		0.0004
		（1.6237）		（0.1656）
$\ln X_{2-4}$		0.0100***		-0.0013
		（2.6079）		（-1.3527）
$\ln X_{2-5}$		0.0015***		0.0004
		（2.6013）		（1.5026）
$Non-agr$	0.0009***	0.0007***	0.0006	0.0006
	（3.5759）	（3.1756）	（1.2054）	（1.5754）
Edu	0.0081***	0.0059***	0.0058***	0.0048***
	（7.8970）	（5.5872）	（3.4297）	（2.5963）
$W \ln TFP$	0.9238***	0.8737***	0.9288***	0.8968***
	（115.5856）	（105.7654）	(80.7689)	(92.9890)
R^2	0.9998	0.9998	0.9998	0.9998
$Log-Likelihood$	-14681.32	-14484.79	-10266.48	-12410.16

Note: ***indicates 1% significance level, ** indicates 5% significance level, * indicates 10% significance level.

3. The Conclusions

1) During the years of 2001-2008, the transportation infrastructure of “the New Silk Road” has significant positive effects on total factor productivity growth, among which promoting effect of Highway, secondary Highway are particularly notable.

2) The effects of four-level Highway and substandard highway on total factor productivity growth is not obvious; while effects of railway, Expressway, highway, secondary highways and tertiary roads on total factor productivity growth is significant, space external effects on total factor productivity growth is larger, accounting for the whole effect of 74.59%. the space external partial effect of the second-level highway is the biggest, when its investment increased 1% each, the *TFP*

growth will be 0.0866%; railway investment increased every 1%, the total factor productivity growth will be 0.0502%, respectively, followed by railway, three level Highway, Expressway and the level Highway, the external effects and overall effects of highway space on growth are least obvious.

3) The contribution share of “the New Silk Road” of transport infrastructure to total factor productivity growth of the stock is 59.0872%. Among them, secondary roads boasts the highest rate of growth in total factor productivity, accounting for 23.9859%, followed by the highway, railway and the tertiary highway’s contribution share.

4) During the years of 2001-2008, “the new Silk Road” traffic economic belt railway, highway has the significant positive effect on total factor productivity growth, while effects of the other classes of highway are no longer notable since 2005, without continuity. This indicates that transportation is the top priority in China's “Western development”, “the rise of central China”, to increasing investment of transportation infrastructure investment has led to significant growth of the “New Silk Road” economic zone.

In order to promote the new round of “the Western development”, revive “the Silk Road”, and build “the new Eurasia Bridge”, it is urgent and realistic that incentives should be given to the traffic Foundation facilities investment of “the New Silk Road” economic with of Central and western area. Especially that to increase policy tilt intensity of Western area, to promote economic development of railway, and expressway construction along “ the New Silk Road”, [31]for coordination economic development in western area, promoting the implementation of the strategy “Central rise” and “the Western development” , finally, to achieve the development of Western areas.

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