

Research on the Influencing Factors of Labor Productivity in Northeast China

Shuang Liu

School of Economics and Management, Beijing Jiaotong University, Beijing, China

16120558@bjtu.edu.cn

Keywords: Northeast region, Labor productivity, Influencing factors.

Abstract. The northeast region was an pioneer of industrialization and a leader of China's developed sectors. As time goes on, the economic development in the northeast region has been slowing down, especially in recent year, and the economic growth is at the lower end of the ranking, labor productivity is an important indicator to measure regional economic development. The growth rate of labor productivity has also begun to decline in recent years. Therefore, starting from the current situation of labor productivity in northeast China, this paper analyses the influencing factors of labor productivity and puts forward the suggestions for improving labor productivity.

1. Introduction

The northeast region has long been at the leading level in the country. Since the reform and opening up, the economic growth of the northeast has been relatively slow. In 1978, the GDP of northeast region accounted for 14.0% , but it fell to 6.7% in 2017. Labor production is an important indicator of the regional economy, labor productivity growth rates is 2.85%, 5.40%, and 2.11% in Heilongjiang, Jilin, and Liaoning provinces in 2016, which are far lower than the national labor productivity growth rate. The improvement of labor productivity plays an important role in the growth of labor productivity. Therefore, this paper analyzes the current situation of labor productivity in the three northeastern provinces from 1996 to 2016, establishes a model to explore the influencing factors of labor productivity in northeast China, and proposes countermeasures to improve labor productivity to promote economic growth. Labor productivity represents production efficiency of workers in a certain period of time, reveals the work efficiency and work ability of the workers in the production process, scholars have obtained rich studies concerning factors affecting labor productivity. Spiegel(1985) used cross-country data to review empirical data on long-term labor productivity and found that physical capital accumulation and human capital accumulation play a vital role in improving labor productivity^[1]. An empirical study by Lazear(2000) shows that the wage gap leads to differences in employee output, because better workers are more inclined to increase their labor productivity in the face of stronger wage incentives^[2]. Doraszelski(2013) used the extended Douglas production function model to find strong correlations between technological progress and corporate labor productivity^[3]. Pietrobelli(2002) thought industrial structure upgrade increase labor productivity^[4]. Liu (2009) based on empirical analysis, concluded government expenditure has a negative impact on urban labor productivity^[5]. Yu and Li (2013) found foreign direct investment has a significant positive impact on labor productivity through conduction mechanism in the long time^[6].

2. Current situation of labor productivity

The labor productivity calculated in this paper is the ratio of total production to employment. In order to deduct price fluctuations, the GDP deflator is used to index the nominal GDP, and obtain the nominal labor productivity and actual labor productivity. The data derive from the Statistical Yearbook from 1996 to 2016. The nominal labor productivity calculated is shown in Figure 2-1. From 1996 to 2016, the labor productivity of the three northeastern provinces reflect a rising trend. The overall gap between the three provinces was small in the early stage, and the gap between the three provinces gradually expands. Liaoning's labor productivity is ahead of the other two provinces'. In the past 20 years, labor productivity of Heilongjiang, Jilin and Liaoning provinces increased by 3.8,

5.5 and 5.2 times respectively, by 2016, the nominal labor productivity of Liaoning has dropped significantly, because Liaoning's GDP fell sharply in 2016, from 2,890.27 billion yuan in 2015 to 2,22,460 million yuan in 2016, resulting in a negative growth in labor productivity.

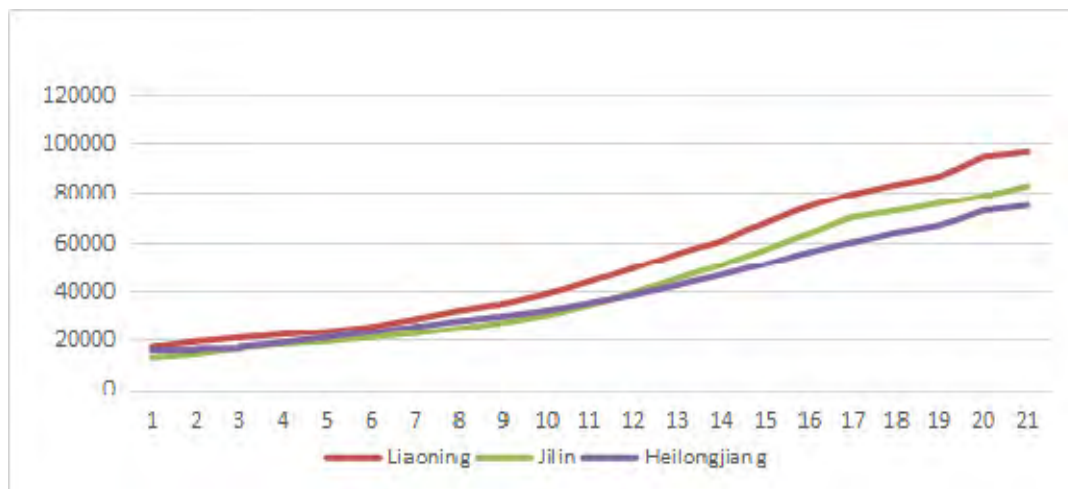


Figure. 1. Nominal labor productivity in northeast China

The actual labor productivity calculated is shown in Figure 3-2. In the 20 years, labor productivity of Heilongjiang, Jilin, and Liaoning provinces increased by 3.9, 7.2, and 4.7 times respectively, the trend is similar to the nominal labor productivity.

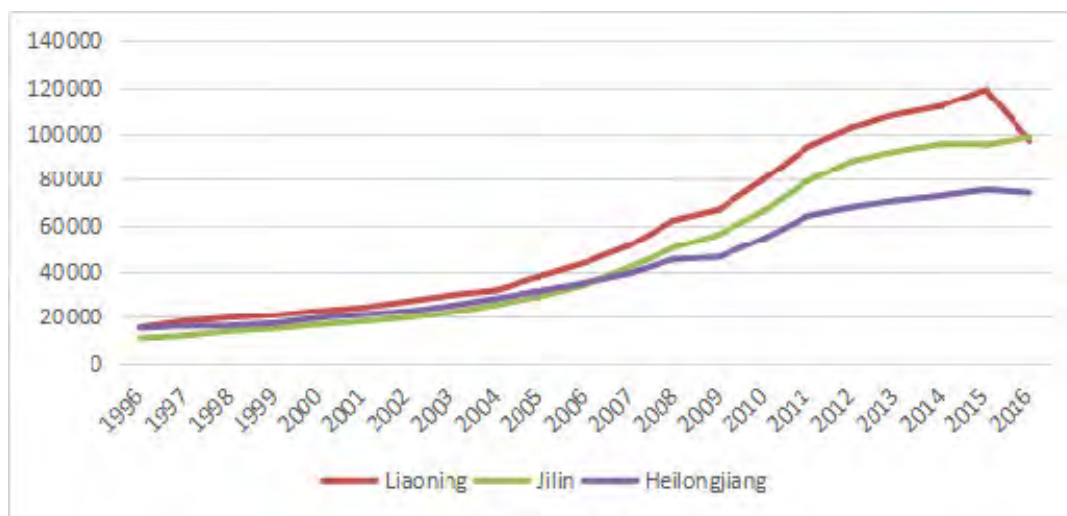


Figure.2. Actual labor productivity in northeast China

3. Empirical analysis

In this paper, labor productivity is the explanatory variable, explained variables include material capital, human capital, wage, technology, industrial structure, financial expenditure, foreign direct investment. The selection criteria of each variable are as follows: material capital(M): it refers to Zhang Jun's measurement method, $K_{it} = K_{it-1}(1 - D_{it}) + I_{it}$, i refers to the province, t refers to the year, and K_{it} and K_{it-1} respectively refer the capital stock of the t and $t-1$, D_{it} is the economic depreciation rate, equal to 9.6%. I_{it} is the fixed assets investment^[7]. (2) Human capital(H): it is measured education years of employers. The degree of education is divided into illiteracy, elementary school, junior high school, high school, which are given to the weights 0, 6, 9, 12, and 16, The calculation formula of human capital is as follows: $H_i = \sum_{i=1}^n h_i l_i$, h_i represents the weight of i degree, and l_i represents the

number of employment with i degree. (3) Wage(W): average annual salary of an urban employee. (4) Technology(R): quantity of patent applications. (5) Industrial structure(S, T): proportion of secondary and tertiary industries. (6) Financial expenditure (G): financial expenditure as a share of GDP. (7) Foreign direct investment(F): the amount of foreign direct investment.

Based on Solow's production function model including human capital, the econometric model in this paper is as follows:

$$\ln(P) = C + \beta_1 \ln(K) + \beta_2 \ln(H) + \beta_3 \ln(W) + \beta_4 \ln(R) + \beta_5 \ln(S) + \beta_6 \ln(T) + \beta_7 \ln(G) + \beta_8 \ln(F) + U_{it}$$

The results of the model are as follows:

Table 1. The influencing factors of labor productivity regression analysis results

Variable name	β_i	S.E	t	P
C	1.0715	0.6613	1.6205	0.1110
M	0.2819	0.0372	7.5751	0.0000
H	0.2617	0.2818	1.4290	0.0970
W	0.3719	0.0596	6.2392	0.0000
R	0.0240	0.0079	3.0106	0.0040
S	0.1478	0.0857	1.7244	0.0904
T	-0.0071	0.0996	-0.0714	0.9433
G	0.1372	0.0736	1.8628	0.0679
F	0.0660	0.0114	5.7696	0.0000

The above equation R^2 is 0.996, indicating that the model fitting effect is better. According to the regression analysis, wages, physical capital, human capital, industrial structure, financial expenditure, foreign direct investment and technology have the significant impact on labor productivity. Wage, physical capital, human capital are the three main factors.

4. Suggestion about improving labor productivity

4.1 Increase labor compensation

First, improve the collective bargaining system of trade unions, unions must play an important in improving the norms of equal dialogue mechanisms for wage issues. Second, the companies need to improve the internal wage growth mechanism of enterprises. When formulating wage levels, enterprises should use labor productivity as a reference. Third, improve the wage supervision mechanism, relevant departments must not only strengthen the supervision of the process of corporate wages, but also strengthen the daily supervision of contract signing, performance and renewal of the contract to ensure that supervision covers all aspects of wages.

4.2 Increase material capital accumulation

On the one hand, government needs to optimize the business environment, government should formulate a series of macro-policies to encourage investigate to create a stable external environment. promote decentralization and decentralization, optimize service reform. On the other hand, it is necessary to improve the efficiency of capital, it can be implemented by promoting financial market reform to improve the transparency of capital, expand the docking channel between capital supplies and demands, and reduce transaction costs in capital markets.

4.3 Enhance human capital

On the one hand, government can increase investment in educational resources to enhance human capital, increase financial support for basic public services, promote vocational and technical education and higher education to cultivate practical and innovative talents. On the other hand, government could reduce the loss of excellent talents, introduce talents, and improve the quality of human capital in the region.

5. Summary

Based on the relevant data from northeast China from 1996 to 2016, this paper describes the current situation of labor productivity and further empirically analyzes the influencing factors affecting labor productivity in northeast China, finds wage, physical capital, human capital are the three main factors, finally, paper proposes suggestion in order to improve labor productivity. Because of limitation the ability of the author, the content of this study is not comprehensive enough, and it needs to be further explored in the future.

References

- [1] Spiegel, M. Determinants of long-run labor productivity growth: A selective survey with some new empirical results [J]. Working Papers in Applied Economic Theory, 1994.
- [2] Lazrar E.P. Performance pay and productivity [J]. American Economic Review, 2000, 90(5) : 1346-1361.
- [3] Dorazaelski U, Jaumandreu J. R&D and productivity :estimating endogenous productivity[J]. Review of Economic Studies. 2013(80): 1338-1383.
- [4] Pietobelli C, Barrera T O. Enterprise clusters and industrial districts in Colombia's fashion sector[J]. European Planning Studies.2002(10): 541-562.
- [5] Liu.Xiuyan. Agglomeration economy and labor productivity: An empirical study based on panel data of Chinese cities[J]. Quantitative Economics & Technology Economics Research, 2009(7): 109-123.
- [6] Yu. Guansheng, Li. Huifang. The impact of FDI on labor productivity: short-term and long-term effects [J]. International Business, 2013 (6): 92-101.
- [7] Zhang. Jun. Estimation of material capital in province: 1952-2000[J]. Economic Research Journal.2002(10):35-44.