



QUALITY OF ECONOMIC GROWTH IN HA GIANG PROVINCE, VIETNAM: TOTAL FACTOR PRODUCTIVITY WITH COBB- DOUGLAS PRODUCTION FUNCTION APPROACH

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Abstract

The study aims to analyze the contribution of factors to the economic growth of Ha Giang province by using the Cobb-Douglas production function, based on data from Ha Giang province's statistical yearbook in the period of 2010-2020. The estimated results showed that the average Gross regional domestic product (GRDP) growth rate in the study period was 7.51%. The capital growth contributed 3.76 percent, the growth in labor contributed 1.17 percent, and the growth in TFP contributed to 2.58 percent to economic growth in Ha Giang province. Additionally, the study found that TFP growth in the service sector is lower than industrial and construction sectors.

Keywords: Ha Giang province, Economic growth, TFP, Cobb-Douglas production function

INTRODUCTION

In the context of limited resources for high growth, it becomes increasingly important to increase productivity. Labor productivity, capital productivity, and total factor productivity (TFP) are increasingly interested and considered essential indicators to evaluate the quality of growth. In Ha Giang province, improving growth quality is an important strategic objective. However, there is still no specific study on the growth quality of Ha Giang province. In this study, using the accounting growth method, we analyzed the quality of economic growth of Ha Giang province in the period 2010-2019 in terms of factor productivity.

LITERATURE REVIEW

The performance of the supply side of an economy is often identified with the growth rate of potential output. Potential output is not observed in reality, however, and has to be approximated. The use of the production function method for the measurement of potential output growth takes into account different sources of an economy's productive capacity, namely the contributions of labour, capital and total factor productivity, the latter containing information about technological and allocative efficiency and hence about the supply-side functioning.

Using the production function, one can discuss changes in the supply-side performance on the basis of the observed simultaneous developments in the quantity of labor, capital and total factor productivity. For instance, an increase in the rate of capital growth accompanied by a rise in trend total factor productivity may signalize some improvement in the supply-side performance. Observing an increase in the rate of the capital growth while trend total factor productivity stagnates, one can, in contrast, deduce that the supply side is functioning ineffectively. The production function thus represents a useful and powerful tool for the macroeconomic analysis and evaluation of the governmental structural policies.

Several studies have attempted to measure productivity and what factors constitutes to it. An increase in productivity produce a greater output as the same level in input, thus result in higher GDP, one of the primary indicators used to measure the health of a country's economy. It determines the economic performance and standard of living of a whole country.

Alwyn Young (1992, 1995) and Paul Krugman (1994) contend that economic growth in Asia is driven by accumulation of the inputs in the production process and not by increase in productivity. They conclude that is not by quality of factors of production but by quantity of it like labor, capital and other inputs that contributes to it like human capital and natural resources. Human capital became popular especially when Human Capital Theory advocated by Becker (1964) and Schultz (1961). Since then, human capital proxies were used to measure variables that cannot be measure or difficult to measure.

Jorgenson et al. (1987) used a cost function approach for each major sector of the US economy to estimate rates of sectoral productivity growth and concluded that productivity growth had been more rapid in agriculture than in other sectors. Lewis et al. (1988) used a production function approach to calculate productivity growth rates for agriculture and for the remainder of the Australian economy (industry plus services) and concluded that the rate of productivity growth in agriculture had been higher than for the remainder of the economy. Martin and Warr (1993) found a bias toward agriculture consistent with higher TFP growth in their profit function study of Indonesia.

Newland and San Segundo (1996) used several measures as indicators of human capital in Peru and La Plata in eighteenth century as physical strength and skills. They see human capital as ability and education of an individual, as the costs of physically raising a child or its health. Ljungberg (2002) uses enrolment and education expenditure on education to look at the causality between education and growth in Sweden between 1867 and 1995; Nunes (2003) considers the behavior of government expenditure on education in Portugal between 1852 and 1995.

Edward C. Prescott (1998) adds human capital in the Cobb-Douglas production function and defined it as investment in training. A proxy variable can be used in place of a variable that cannot be measured or is difficult to measure. The proxy variable may not be the center of the interest itself, but has a close correlation with the variable of interest. Theory of Lucas (1988) indicate that average years of education can be used as proxy for the share of resources devoted to human capital formation.

A recent paper by Castello and Domenech (2006) further examines the influence of human capital distribution on economic growth. The authors provided new human inequality measures to analyze inequality and economic growth for a broad number of countries. This paper suggests that “human capital inequality negatively influences economic growth rates not only through the efficiency of resource allocation but also through reduction in investment rates”.

A study by Nguyen Van Nam and Tran Tho Dat (2006) on Vietnam's growth quality has shown that the efficiency of capital use, investment efficiency is lower and lower. They also show that TFP's contribution to growth is low and tends to decrease while increasing physical capital accounts for a high proportion in GDP growth. Another study by Phan Minh Ngoc (2007) has estimated the contribution of the inputs to economic growth in Vietnam in the period 1975-2003. Accordingly, Vietnam's growth in this period was mainly based on the contribution of physical capital. This proves that the quality of Vietnam's economic growth in the past period is low and needs to be improved in the coming years.

METHODOLOGY

Total Factor Productivity (TFP) is the portion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensely the inputs are utilized in production. Model the potential output using the two factor Cobb-Douglas production function with Hicks-neutral technology:

$$Y_t = A_t L_t^\alpha K_t^\beta$$

where Y, L, K and A are real GDP, labor input, capital input and the total factor productivity (TFP) level respectively.

The specification of the production function is a special case of the constant--elasticity-of-substitution production function (CES), with the elasticity of substitution equal to one and with the usual theoretical assumptions used in the empirical literature. As mentioned earlier, positive and diminishing marginal products of each input (L, K) are assumed. This restricts both α and β to values between 0 and 1. Second, returns to scale are assumed to be constant, i.e. $\beta = (1 - \alpha)$. Equation (1) can be converted to linear form as follows:

$$y = A \cdot k^\alpha \leftrightarrow \ln y = \ln A + \alpha \ln K$$

Where, $y = Y / L$ is output per worker; $k = K / L$ is capital per worker.

The data on GDP, L, and K are taken from Ha Giang province's statistical yearbook in 10 years (2010-2020). The model was estimated using SPSS software with the method of least squares (OLS-Ordinary Least Square).

RESULTS AND DISCUSSION

TFP growth and TFP's contribution to Ha Giang province's economic growth

In order to develop the economy in a sustainable way in the long term, the economies are gradually moving from wide economic development to deep development. Among the inputs (mainly capital and labor), the TFP plays an important role in sustainable economic development. TFP is evaluated based on two main dimensions, the TFP growth rate and the contribution of TFP to the local gross domestic product (GRDP) growth.

Currently, studies on TFP growth and contribution of TFP to GRDP growth are calculated in two approaches: (i) growth accounting method and (ii) Cobb-Douglas production function. According to the research scope of the topic, to match the research period, data sources, and research purposes, we have calculated the TFP growth rate and the contribution of TFP to economic growth in Ha Giang province Cobb-Douglas production function method. With existing data sources and through many steps to calculate the results obtained as follows:

Table 1. Growth of GRDP, capital, labor and TFP's Ha Giang province for the period 2012-2020

Unit: %

Year	GRDP growth rate	Capital growth rate	Labor growth rate	TFP growth rate
2012	8.11	30.52	0.98	-2.27
2013	8.34	-19.09	5.89	10.39
2014	6.58	-3.13	1.29	6.70
2015	10.68	7.44	-2.39	9.94
2016	6.53	13.99	3.80	-0.52
2017	7.72	14.29	0.44	2.87
2018	6.64	16.64	3.60	-1.11
2019	6.00	15.88	-0.59	1.35
2020	7.00	30.00	2.38	-4.16
2012-2020	7.51	11.84	1.71	2.58

(Source: Ha Giang Statistical Office and author's calculations)

The data show that among the three factors affecting the growth rate of GRDP in the period 2012-2020, the capital growth rate is the highest with an average of 11.84% / year; labor increase 1.71% / year; The average TFP growth rate is relatively high with 2.58% / year. In 2012-2015, the growth rates of capital and labor both tend to slow down over the years. In 2012, the growth rate of capital reached 30.52% and decreased sharply by 2015 with an increase of 7.44%; labor in 2013 increased sharply, gained 5.89%, and then gradually reduced until 2020 to -2.39%. TFP growth rate in 2013 and 2015 increased significantly at 10.39%, and 9.94% was the highest growth rate in the whole period. From 2016-2020, TFP tends to decrease gradually.

Table 2. Contribution of factors to economic growth

Unit: %

Year	GRDP growth rate	Contribution to GRDP growth of:			Proportion of contribution to GRDP growth of:		
		Capital	Labor	TFP	Capital	Labor	TFP
2012	8.11	9.71	0.67	-2.27	119.75	8.23	-27.98
2013	8.34	-6.07	4.02	10.39	-72.81	48.21	124.60
2014	6.58	-1.00	0.88	6.70	-15.12	13.40	101.71
2015	10.68	2.37	-1.63	9.94	22.17	-15.26	93.09
2016	6.53	4.45	2.59	-0.52	68.16	39.75	-7.91
2017	7.72	4.55	0.30	2.87	58.91	3.88	37.21
2018	6.64	5.29	2.45	-1.11	79.74	36.96	-16.70
2019	6.00	5.05	-0.40	1.35	84.21	-6.69	22.48
2020	7.00	9.54	1.62	-4.16	136.29	23.14	-59.43
2012 -2020	7.51	3.76	1.17	2.58	53.48	16.85	29.67

(Source: Ha Giang Statistical Office and author's calculations)

The average GRDP growth rate in the period 2012-2020 is 7.51%. The increase in fixed assets contributed 3.76 points%, the increase in labor contributed 1.17 points%, and the increase in TFP contributed to 2.58 points%.

Regarding the proportion of the contribution of factors to GRDP growth in the period 2012-2020, Ha Giang province, capital factor still plays a vital role with the average contribution rate of 53.48%, labor contribution - 16.85%, and TFP contribution - 29.67%. It can be seen that in the period 2012-2014, the share of capital contribution decreased from 119.75% in 2012 to -15.12% in 2014. However, in the period from 2015 to 2020, the percentage of capital contribution increased gradually, with 22.17% in 2015 and 136.92% in 2020. During the entire study period, the share of the labor contribution increased and decreased unevenly, the highest in 2016 with 39.75% and the lowest in 2017 with 3.88%. Meanwhile, TFP's contribution to GRDP growth fluctuated over the years. In 2013, TFP's share was the highest at 124.6%.



Figure 1. Contribution of factors to economic growth in Ha Giang province

In 2012-2020, the contribution of capital to the province's economic growth and labor accounted for 70.33%, TFP's contribution was only 29.67%. This figure shows that the province's growth was mainly based on increasing mobilization of investment capital and labor during this period. The contribution of other factors such as technology level, labor quality, management process... to GRDP growth is limited. It proves that the province's economy in 2012-2020 grows in quantity, meaning that the growth is still mainly developed in width and has not yet shifted strongly to in-depth development.

In the province's economic growth rate, investment capital growth is quite significant, accounting for 53.48%. The investment capital source is mainly from the state budget for critical projects such as irrigation systems, community service works (roads, hospitals, schools, ...), and residential capital. Attracting foreign direct investment is limited. The labor factor contributes relatively high, accounting for 16.85%. This shows that the province's economic growth also relies mainly on the number of employees in addition to the capital factor. The annual average local labor force in the period 2012-2020 increased by 1.71%. However, in the local workforce, the workforce in the agriculture, forestry, and fisheries sectors account for the majority (accounting for 77.3% of the total number of workers working in economic sectors). In addition, the qualification level of workers working in the production and business sectors of the province is generally low. The labor force in rural areas concentrated mainly on agriculture, forestry, and fisheries; build; wholesale, retail, repair of cars, motorbikes, ... and accommodation and catering services. Labor in industries and services sectors with high quality, knowledge economy still accounts for a low proportion.

TFP growth rate and the contribution of TFP to the growth of economic sectors in Ha Giang province in the period 2012-2020

- The TFP growth rate and the contribution of TFP to the growth of the Agriculture, Forestry and Fisheries sector

The GRDP growth rate of the agriculture, forestry, and fishery sector is relatively low in 2016-2020; the average growth rate of the whole period is 3.92% / year. Among the factors affecting the growth of this sector during this period, the capital still plays a leading role with a contribution rate of 5.98%. The average labor contribution of the whole period is very low. The share of employees that contribute negatively to growth is 0.17%. The shift of labor from the agricultural sector to the non-agricultural, forestry, and fishery occupations with high and stable incomes is the reason. The TFP growth rate of the agriculture, forestry, and fishery sectors in 2016-2020 reached a negative value of -2.23% / year.

Table 3. TFP's growth rate and its contribution to growth in agriculture, forestry, and fishery sector for the period 2016-2020

Unit: %

Year	GRDP growth rate	Contribution to GRDP growth of:		
		Capital	Capital	TFP
2016	5.25	30.29	-3.37	-21.66
2017	3.52	-17.88	2.99	18.41
2018	3.52	2.85	0.40	0.27
2019	3.63	17.14	0.62	-14.13
2020	3.67	-2.48	0.21	5.94
Average	3.92	5.98	0.17	-2.23

(Source: Ha Giang Statistical Office and author's calculations)

- The growth rate of TFP and the contribution of TFP to the growth of Industry and construction

The growth rate of GRDP in industry and construction in 2016-2020 is 10.75% / year. In the average growth rate of 10.75% / year of industry and construction, the contribution of capital factor is 2.27 points%; labor contributed 14.31 points%, and TFP did not contribute to industry growth with a negative value 5.83 points%. It can be said that growth in the industrial and construction sectors is still primarily driven by labor growth. Investing in this area has yet to be a priority.

Table 4. Growth rate and contribution of TFP to growth in industry and construction sector over period 2016-2020

Unit: %

Year	GRDP growth rate	Contribution to GRDP growth of:		
		Capital	Lao động	TFP
2016	7.08	7.72	14.31	-14.96
2017	16.21	2.12	7.91	6.18
2018	11.78	-0.40	25.55	-13.38
2019	10.12	-3.59	15.59	-1.89
2020	8.55	5.49	8.19	-5.12
Average	10.75	2.27	14.31	-5.83

(Source: Ha Giang Statistical Office and author's calculations)

- The growth rate of TFP and the contribution of TFP to the growth of the Service sector.

The GRDP growth rate in the service sector in the 2016-2020 period is on average, 6.4% / year. TFP growth in the service sector was low in the early years of the period. The speed and the contribution rate of investment capital and labor increased highly due to focusing on developing new commercial and service capacity. This makes the TFP growth rate in many

years have negative values. The contribution of factors to GRDP growth in the service sector in the period 2016-2020 is an increase in capital contribution (6.21 points%), an increase in labor contribution (6.81 points%), and TFP's negative contribution of -6.62 points %.

Table 5. Growth rate and contribution of TFP to growth in the service sector over period 2016-2020

Unit:%

Year	GRDP growth rate	Contribution to GRDP growth of:		
		Capital	Lao động	TFP
2016	6.91	-6.57	-3.07	16.55
2017	6.94	4.93	19.57	-17.56
2018	6.32	13.89	11.70	-19.27
2019	6.35	19.70	-3.94	-9.41
2020	5.49	-0.90	9.81	-3.42
Average	6.40	6.21	6.81	-6.62

(Source: Ha Giang Statistical Office and author's calculations)

CONCLUSION

Analysis of TFP contributions in different economic sectors helps policymakers to have a better understanding of the leading role of industries in the province's growth. Besides, they have a better view of the impact of capital factors, labor, and TFP for each sector. The analysis results show that the capital factor plays a vital role in the factors' contribution to GRDP growth in the period 2012-2020 in Ha Giang province..

For the industrial and construction sector. During the 2016-2020 period, this sector achieved the highest growth rate compared to the general growth rate, with 10.75%. However, TFP's contribution is low compared to the contribution of capital and labor. It can be seen that the industrial and construction sectors mainly grow in width.

For the service sector. In the 2016-2020 period, this sector's growth rate is not high compared to the general growth rate, with an average increase of 6.4%. Both investment capital and labor are concentrated in this area. As a result, TFP growth is low compared to capital and labor growth which is lower than industrial and construction sectors. This shows that the efficiency of using capital and labor in this area is limited and lowest compared to the other two sectors..

For the agriculture, forestry and fishery sector. In the period 2016-2020, this area achieved the lowest growth rate among three industries, with an average growth rate of 3.92%. The growth of this sector is mainly due to the increase in capital investment.

These findings suggest several recommendations for policymakers to promote economic growth in Ha Giang province, including developing human resources, attracting high-quality labor, attracting investment towards growth model innovation, improving quality growth, improving labor productivity. Besides, to develop the economy sustainably, the policymakers in Ha Giang province needs to continue to implement economic restructuring and labor shift from the agricultural sector to the industrial and service sector with higher economic efficiency. Additionally, services should continue to be seen as a critical sector in the province's economic development, focusing on the tourism sector.

Further research work needs to be done with adding qualitative dimensions, such as environmental, social factors, and inequality level, to evaluate the economic growth quality of Ha Giang province.

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