

THE PRELIMINARY ANALYSIS OF THE ESTIMATION METHOD OF ICT CAPITAL STOCK AND ITS IMPACT ON ECONOMIC GROWTH

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The relationship between ICT and economic growth has become a current research focus. This article mainly studies the estimation method of ICT capital stock, and the influence of ICT on the total economy and economic growth efficiency, so as to provide a reference for the development of the ICT industry in the future.

Keywords: ICT; capital stock; estimation method; economic growth quality.

In recent years, the rapid development of information and communication technology (ICT) has accelerated the development of informatization process in China, and the status of ICT in the development of the national economy has also been enhanced. ICT has not only changed people's lifestyles, but also changed the production methods of major industries. It has had a strong impact on China's economic growth and has gradually become a strong driving force for China's high-quality development. Therefore, the study of the relationship between ICT and economic growth is an important topic. This article deeply analyzes the current situation of ICT capital stock estimation, combined with previous research results, summarizes the key elements of ICT capital stock estimation, and builds an estimation model. In order to study the relationship between ICT and economic growth, the ICT capital and economic status of Southeast Asian countries are analyzed in depth, and the impact of ICT on aggregate economic growth and economic growth efficiency is studied.

1. MAIN ESTIMATION METHODS OF ICT CAPITAL STOCK

Key Elements of ICT Capital Stock Estimation

Scholars in many countries have conducted extensive research on the estimation of ICT capital stock. From the initial total estimation to the estimation by region and industry, scholars have conducted a lot of research and exploration. This article summarizes previous research results, conducts an in-depth analysis of ICT capital stock estimation methods, and combines the current status of ICT capital stock estimation, and summarizes the four key elements of capital stock estimation:

Base period capital stock; Fixed capital investment sequence; Fixed asset prices index; Depreciation rate.

Base Period Capital Stock.

We can determine the base year before estimating the base period capital stock. The base year is not uniform, it is determined according to the time of informatization development, and different countries have different stages of informatization development, and the selection of the base year is quite different. The UK's ICT industry only began to develop rapidly in 1989, and ICT capital investment before 1989 did not affect the capital stock estimation in 1989. Therefore, when estimating the basic British ICT stock, the base year is often set at 1989. Some scholars have positioned the base year of Chinese ICT capital estimation as 1985, mainly because China's industrial revolution officially began in 1984.

After the base year is determined, the basic stock of the base period begins to be estimated. There are three main estimation methods:

a. The backward method, which assumes the growth rate of ICT investment is constant, and combines the depreciation rate and ICT capital stock in a given year before the base period. The perpetual inventory method can calculate the base period capital stock.

b. The overall method, which assumes that the investment amount increases by the same amount, and assumes that the base period basic stock is the sum of the investment amounts in all years before the current year, so only the ICT investment in a certain year before the base period. The amount can be calculated the base period capital stock of the current year.

c. The growth rate method, which assumes that the growth rate of the investment amount remains unchanged, and that the base period capital stock will be equal to the base period investment amount divided by the sum of the depreciation rate and the growth rate of the investment amount.

Fixed Asset Investment Sequence.

One of the key factors in estimating the capital stock is the fixed asset investment sequence. Since there is no separate statistics on ICT fixed asset investment, it is generally based on some data track fixed asset investment sequence. The first is to estimate the ICT fixed asset investment sequence based on the statistical data of the national accounts. The second is to estimate the investment sequence based on data such as import and export and sales. The third is to use input-output data, assuming the growth rate of ICT investment and domestic demand to estimate the asset investment sequence.

Fixed Asset Price Index.

The ICT fixed asset price index is not officially released. Generally, there are three methods for determining it: one is to directly substitute the relevant fixed asset investment price index; the other is to use statistical methods for

systematic measurement; and the third is to use the harmony index method to find the ICT price index. The direct substitution method is only applicable when there is little difference between the ICT price index and other fixed asset investment price indices. However, with the continuous development of science and technology and the continuous improvement of the quality of ICT products, there is a difference in the price index between the two, and the direct substitution method is not universal. The statistical method analyzes based on multiple characteristics and takes into account the ICT quality change factors, which is more accurate than the fixedend price index of the direct substitution method. The most accurate method for measuring the ICT price index is the Harmony Index Method, which assumes that ICT and non-ICT capital goods have similar changes in trends. According to the national non-ICT price index and the U.S. ICT and non-ICT price index Perform calculations.

Depreciation Rate.

The choice of ICT depreciation rate is mainly divided into two types: the first is to select the depreciation rate by analyzing the useful life and characteristics of hardware, software and other assets; the second is to distinguish ICT investment in detail when statistical data is relatively scarce. Directly set a common depreciation rate for ICT capital.

As the core and general purpose technology of the modern technology system, information and communication technology (ICT) is leading a new round of industrial revolution. Its innovative development and application will have a significant impact on the quality of economic growth. ICT capital investment has grown rapidly and the effect of capital deepening is obvious , The contribution share of ICT capital to the total economic output is on the rise; according to the composition analysis of the capital stock elements of the impact of ICT on the industrial structure, we understand the composition of the capital stock, and use the contribution and effects of the ICT capital stock model (Figure 1). Finally, Put forward the leading role and related suggestions for improving the quality of national economic growth through ICT.

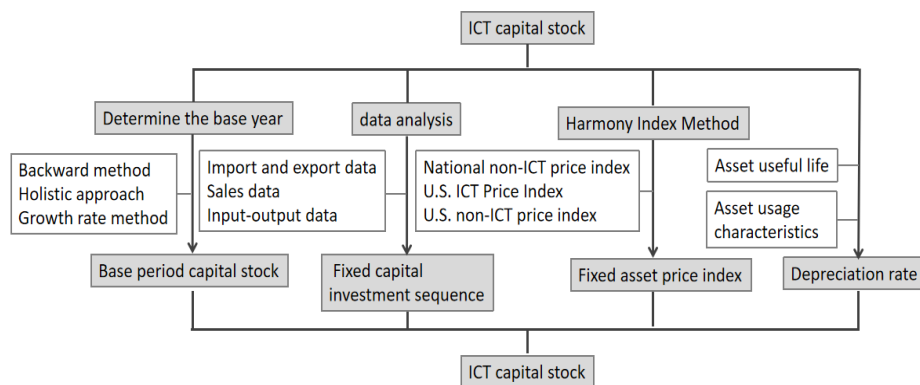


Fig. 1. Source: on the author's development

2. THE IMPACT OF ICT ON AGGREGATE ECONOMIC GROWTH

ICT and Economic Growth

1. Research methods of ICT capital and aggregate economic growth.

There are two main research methods for ICT capital and aggregate economic growth, the measurement method and the growth algorithm. The measurement method is based on the actual situation, avoiding the theoretical relationship between income share and production elasticity, without assuming market profit maximization, and directly estimating the output elasticity of input factors with market feedback data, which is more in line with the actual market conditions. However, due to the continuous development of ICT, the quality and price of ICT products are constantly changing, and these factors are not fully reflected in the market macro data, and the estimated influence coefficient will be inaccurate. The growth algorithm is to explain the economic growth of a country or industry through the growth of input factors and the growth of total factor productivity, so as to distinguish the contribution degree of different types of input factors to economic growth. When there are complete ICT statistics, it can be divided into ICT capital and non-ICT capital, so as to distinguish the impact of the two on economic growth and quantify the contribution of input and output. The growth algorithm is a mainstream research method with strong operability, but it also has obvious shortcomings. The main reason is that the root cause of economic growth is not clear. It only analyzes the source of economic growth based on a theoretical framework, and the theoretical framework is based on this assumption, research results are susceptible to influence.

2. The main impact of ICT capital on aggregate economic growth

Before the 21st century, information and communication technology was not developed, and the level of network information development was relatively backward. ICT capital statistics and economic aggregate growth statistics were imperfect or even inaccurate, leading scholars to have a relationship between ICT capital and aggregate economy dispute. Most scholars believe that ICT capital has a significant role in promoting the total economic volume. A few scholars believe that ICT capital has minimal impact on the total economic growth and even believes that ICT capital has a negative effect on the total economic growth.

After entering the 21st century, with the development of ICT and the popularization of the Internet, the data of ICT capital and total economic volume have become more and more perfect. Scholars have generally formed a unified view that ICT capital has a important role in promoting the total economic volume. To this end, this article analyzes the ICT capital and economic status of Southeast Asian countries, including Vietnam, Laos, Brunei, Cambodia, Singapore, Malaysia, Indonesia, Myanmar, the Philippines, Thailand and other countries. The analysis results show that the more developed regions, such as Singapore and Malaysia, have a more obvious promotion effect of ICT capital on the total economic growth, while the economically backward regions, such as Myanmar and Vietnam, their ICT capital contributes less to the total economic growth .

ICT and Economic Growth Efficiency

ICT can optimize the ability to transmit, process, and store information, thereby improving the level of informatization of social life and industrial production. Since the efficiency of economic growth is generally expressed through total factor productivity (TFP), the study of ICT and economic growth efficiency is transformed into a study between ICT and TFP. According to the analysis results of 10 countries in Southeast Asia, it can be found that ICT contributes to the improvement of TFP, which means that ICT can improve the efficiency of economic growth.

There are two main paths for ICT to improve the efficiency of economic growth. The one is to use ICT to build an information network. The more network users, the greater the value of the information network, and the greater the role of ICT in the spillover and diffusion of information technology. The greater the contribution of ICT capital to TFP through network effects, thereby improving the efficiency of economic growth. The second is that ICT can play a huge role in generating, storing and transmitting information, enhancing the synergy between various elements in the production process of enterprises, and solving the problem of information asymmetry. It has improved the work efficiency of the information technology production depart-

ment, and also has a positive effect on the information technology use department. The TFP of each department has been improved, and the efficiency of economic growth has also been improved.

This article analyzes the current situation of ICT capital stock estimation in depth, and summarizes the four elements of the estimation, namely base period capital stock, fixed capital investment sequence, fixed asset price index and depreciation. Based on these four elements, a scientific and reasonable construction of ICT capital stock estimation is made. In addition, by analyzing the ICT capital and economic status of 10 countries in Southeast Asia, a series of studies have been conducted on the impact of ICT on economic growth. The Study have shown that ICT capital in economically more developed areas has a more obvious effect on the total economic growth, while ICT capital in economically underdeveloped areas has a small contribution to the total economic growth. What's more, ICT helps to increase TFP, there by improving the efficiency of economic growth.

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