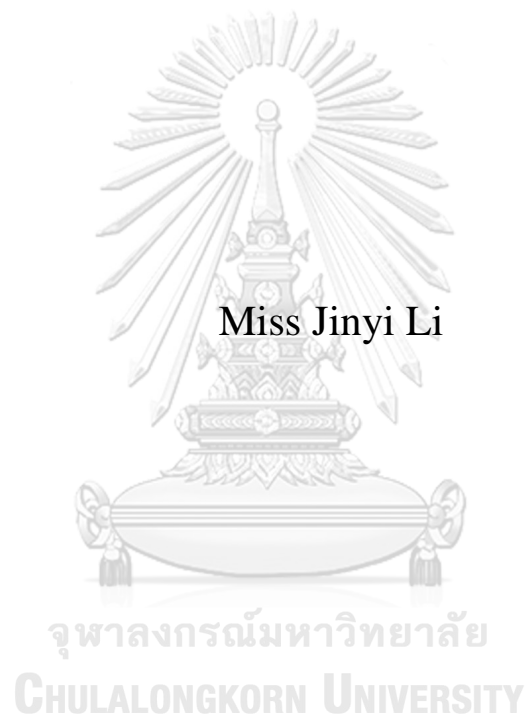


Role of E-commerce on Trading Sector in China



Miss Jinyi Li

A Thesis Submitted in Partial Fulfillment of the Requirements
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บทบาทของพาณิชย์อิเล็กทรอนิกส์ต่อภาคการค้าในประเทศจีน



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต
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อีคอมเมิร์ซหรือพาณิชย์อิเล็กทรอนิกส์ในประเทศจีนนั้นได้มีการพัฒนาควบคู่ไปกับเทคโนโลยีสารสนเทศอย่างรวดเร็ว ดังนั้นการศึกษาค้นคว้าวิจัยนี้มีวัตถุประสงค์เพื่อวิเคราะห์การมีส่วนร่วมช่วยของอีคอมเมิร์ซในภาคส่วนของการค้าภายในประเทศจีน และประเมินผลกระทบของอีคอมเมิร์ซต่อเศรษฐกิจระดับมหภาครวมถึงผลกระทบต่อเศรษฐกิจรายสาขาตามลำดับด้วยข้อมูลแบบ **fixed effect panel data** จากเจ็ดภูมิภาคที่เลือกในประเทศจีนช่วงระยะเวลาปี 2551-2559 โดยผลการศึกษาพบว่าอีคอมเมิร์ซมีบทบาทสำคัญเชิงบวกต่อเศรษฐกิจอย่างชัดเจน ไม่ว่าจะในระดับเศรษฐกิจมหภาคหรือระดับภาค ซึ่งในทุก ๆ 1 เปอร์เซ็นต์ที่เพิ่มขึ้นของการขายในอีคอมเมิร์ซจะนำไปสู่การเพิ่มขึ้น 0.54 เปอร์เซ็นต์ในภาคการค้า อีคอมเมิร์ซมีอิทธิพลอย่างมากต่อภาคการค้าและเป็นหนึ่งในแรงขับเคลื่อนหลักสำหรับการพัฒนาเศรษฐกิจในประเทศจีน



สาขาวิชา	เศรษฐศาสตร์และการเงินระหว่างประเทศ	ลายมือชื่อนิสิต
ปีการศึกษา	2561	ลายมือชื่อ อ.ที่ปรึกษาหลัก

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E-commerce is rapidly developing along with the development of information technology in China. This paper is aimed at analyzing the contribution of E-commerce on the trading sector in China and estimating the macroeconomic and sectoral impact of E-commerce respectively by using fixed effect panel data based on the data from seven selected regions in China over the period of 2008-2016. The study found that E-commerce plays a significant and positive role in the economic growth at either macroeconomic level or sectoral level. Every 1 percent increase in E-commerce's sale leads to an increase of 0.54 percent in the output in the trading sector. E-commerce has a great influence on trade sector, and it has become one of the main driving forces for economic development in China.



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Chapter 1 Introduction

1.1 Internet Development in China

The Internet was spawned with the rapid development of human production and information technology and life have been greatly upgraded and altered. Particularly after the 21st century, all aspects of lives of people are connected to the Internet more and more. In 2015, with the improvement and launch of the national "Internet +" action plan in China, the influence of the Internet on community had gone into a new stage. According to the "41st Statistical Report on Internet Development in China" released in January 2018, "as of December 2017, the amount of Chinese Internet users reached 771 million, and the total number of new Internet users got to 40.73 million. The Internet penetration rate was 55.8%, a gain of 2.6% from the end of 2016 " (see Figure.1). The huge national population is closely related to the Internet. The Internet has deeply involved various aspects of residents' daily life and has profoundly changed the way of life of modern residents.

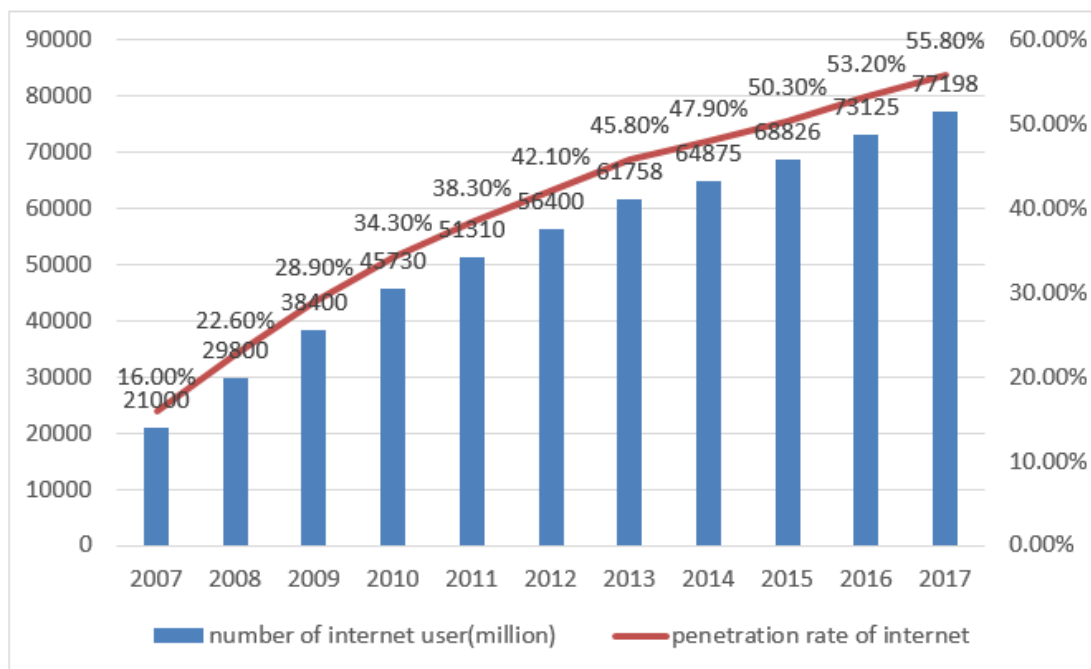


Figure 1. The number of internet users and penetration rate of internet
 (Source: 41th Statistical Report on Internet Development in China)

With the continuous development of global economic integration and modern information technology, E-commerce, an emerging form of trade applying electronic information technology to trade and other areas, has come out. The world was swept by the financial crisis originating in the United States in 2008, and various countries' economies were influenced to varying degrees. E-commerce is full of energy for development. E-commerce of China started in 1997 and has grown speedily from that time. In the past decade, the number of Internet users in China has been increasing. With the popularity and emergence of E-commerce portals such as Jingdong and Taobao, people are depending on E-commerce increasingly in their daily lives, and their spending habits have also changed. E-commerce is growing quickly in China, and its influence on social and economic life is rising. It is becoming the main driving force for economic development of China. "2016 is the first year of China's E-commerce '13th Five-Year Plan' and the transition year for E-commerce of China upgrade. In that year, 26.1 trillion RMB was reached by the total amount of E-commerce transactions, a year-on-year rise of 19.8%. As an important section of the digital economy, E-commerce of China continued to grow steadily in 2016, showing a diversified, service-oriented, standardized, and internationalized development trend " (China E-commerce Report, 2016).

1.2 Objectives and Significance

1.2.1 Objectives

This paper is aimed at investigating E-commerce's impacts on the Chinese macro economy as well as the trading sector respectively by choosing 7 outstanding regions, and proposing some suitable suggestions for E-commerce's development in China that is based on the results this paper get and analyzing E-commerce's contribution on Chinese economic growth.

1.2.2 Significance

E-commerce's development has caused rapid changes in the structure of the world economy. With the rapid development of economic globalization, structural adjustment has become a hot spot of global concern. As obviously seen, developed countries are mainly based on high-tech and information industries, moving toward a higher level of economic structure, and the economy is growing rapidly. In order to

cope with this trend, China has adjusted the market economy, the way companies operate, people's daily consumption habits and government function management, so that China's social resources are effectively utilized.

Also, the impact of E-commerce to China's social economy has dramatically surpassed the traditional business, penetrated into all aspects, and brought great changes to people's lives. E-commerce has created new consumer demand, created more opportunities for entrepreneurs and innovation institutions, and accelerated the cooperation of various industries to optimize the industrial structure.

E-commerce plays a considerable role in the Chinese economy, in order to further encourage the economy's sustainable development, people should pay attention to E-commerce's role. In this informative 21st century, E-commerce has become essential to work and lives of people, and a substantial rise will be brought by its emergence definitely in the Chinese economy.

1.3 Scope of the Study

The study examined the impact of E-commerce on the growth of output both in macro and sectoral perspectives respectively. E-commerce is not an unusual event in China, it is booming in some eastern Free Trade Zones and Economic Zones. In terms of transaction size, the eastern provinces accounted for 85.3% of the country, so this paper chooses 6 Eastern provinces and 1 special economic zone in China to examine how much of economic growth contributed by E-commerce. The 7 regions consist of Guangdong province, Zhejiang province, Shanghai, Beijing, Jiangsu province, Fujian province and Hainan province where Shanghai and Beijing are direct-administered municipalities of China, have the same rank as provinces, and form part of the first tier of administrative divisions of China.

The data used in the estimation were from E-commerce report in China, China E-commerce Market Data Monitoring Report and National Bureau of Statistics, and the period of data is from 2007 to 2016.

1.4 Limitation of the Study

This thesis conducts empirical study that is based on existing data. E-commerce is growing speedily in China, but it is yet an emerging industry. The relevant statistical data on the development of E-commerce in China is incomplete enough and the time period of data coverage that can be collected is relatively short.

The variables for measuring the development level of E-commerce needs to be optimized in future due to the limitations of subjective thinking and the lack of a unified measurement of E-commerce development level in China.

In addition, the E-commerce data for the provinces selected in this study is not complete. On one hand, it's difficult to find the data of capital in E-commerce and regional labour force in E-commerce, so this study just takes total investment in fixed asset in wholesale and retail trade as the proxy of K_{trade} and uses employment in wholesale and retail trade to be a measurement of LF_{trade} . On the other hand, the statistical time of E-commerce development in various provinces is different, therefore E-commerce transaction data in E-commerce developed regions is relatively complete, and other regions lack early development data.

1.5 Contribution of the study

As an emerging industry, information technology-based E-commerce has rapidly developed and improved in China as a new model of economic development. It has gradually become one of the driving forces for China's economic development, attracting more and more attention and interest. However, at this stage, there are not many empirical studies on the impact of E-commerce on economic development, and few scholars from other countries have conducted in-depth research on it. This study is a good complement to this field, contributing to the study of E-commerce's development in China, and also helping foreign scholars understand the development of E-commerce in China and arousing their greater interest in E-commerce research in China. In addition, the research results provide a theoretical reference for China's government to further stimulate E-commerce and make policy decision on a right direction, and expand the development ideas in this field.

Focusing on the core issues of E-commerce impact on economic growth, this study will be organized by the following seven parts. Chapter 1 introduces the research

background of this paper and clarifies the research purpose and states the limitation and contribution of this study. Chapter 2 presents the definition of E-commerce, the history and business model of China's E-commerce, competitive advantage and the status of China's E-commerce in recent year. Chapter 3 introduces E-commerce research in China and other countries from the aspects of E-commerce research and the impact of E-commerce on the economy. Chapter 4 discusses how E-commerce promotes economic development. Chapter 5 analyses the contribution of E-commerce on the economy from the perspective of the regional economy and sectoral economy. Chapter 6 is the results of the model and the discussion of results. Chapter 7 is the main conclusion of this paper.



Chapter 2 E-commerce in China

2.1 Definition of E-commerce in This Paper

On July 1, 1997, the US Clinton Administration issued the "Global E-commerce Outline" which defines E-commerce as a variety of commercial activities, including advertising, transactions, payments, and Internet services. On November 6, 1997, the International Chamber of Commerce held a World E-commerce Conference in Paris. The definition of E-commerce is as follows: E-commerce is the realization of the entire trade activity electronically. The WTO also owns its definition: "E-commerce refers to production, marketing, and distribution activities through electronic communication networks". The definition of E-commerce in the Organisation for Economic Co-operation and Development (OECD): " E-commerce is a business transaction between companies or between consumers and firms on an open network ". As, General Electric Company (GE) understands E-commerce as an electronic transaction, including E-commerce between companies and companies and between enterprises and consumers, more similar to OECD's definition, Hewlett-Packard (HP) defines E-commerce as an E-business transaction, the link between suppliers and clients. The definition of E-commerce in the European Parliament is that the electronic activities of informatization and electronics are referred to collectively as E-commerce. It contains too much, for example, to electronically process text, sound, and images into other forms that are electronically processed into data and information for delivery. It covers a wide range of topics, for example, the most relevant to us is e-freight, the transmission of online data and the acquisition of public goods. It includes not only products, but also some service information, introduces some new activities in the process of information transfer of consumer goods, and promotes these activities.

In China, the initial definition of E-commerce came from the Shanghai E-commerce Management Center. They believe that E-commerce is a commercial activity carried out through the use of digital electronic means to disseminate and interoperate business data. They call this activity E-commerce. According to the definition of the Ministry of Commerce of the People's Republic of China, E-commerce (EC) in the narrow sense can be called electronic transaction. It refers to the use of electronic means for various commercial activities centred on a commodity exchange, such as business

activities between enterprises and enterprises, companies and consumers using computer networks. In most cases, we usually say that E-commerce refers to narrow E-commerce. Extensive E-commerce (EB) covers a wide range of topics, including all aspects of social life. For example, if we subscribe to news via SMS, send an email to invite customers to open a new product exhibition, and query the relevant data through the organization's internal network, they are all in the E-commerce category.

2.2 The History of China's E-commerce

According to Ali Research Institute¹, E-commerce in China has appeared since 1995. In the past twenty years, it has gone through four stages of development. This is a process of continuous improvement, expansion and enrichment. (Hao, 2015).

(1) First Stage

The Internet has entered China at this stage, and E-commerce is booming. At this time, E-commerce of China is to explore E-commerce growth models mainly among companies. Individuals and companies mainly regard E-commerce as a instrument that can optimize business activities, like collection of communication and information by using e-mail.

Several E-commerce sites were built between 1995 and 1999. In 1995, China Yellow Pages was founded the by Jack Ma, the first Internet firm to provide companies web page creation services. Then, by the end of 1999, many E-commerce websites such as 8848, Ctrip, Alibaba and Dangdang were established. The end of 1999 was Chinese Internet applications' climax. The number of B2C network companies has risen from more than 370 to more than 700 by the year 2000. The good times, however, do not last so long. With the bursting of the Internet bubble in 2000, a huge quantity of E-commerce corporations shut down. From then on, E-commerce of China has started a long "ice age."

(2) Second Stage

Since 2003, E-commerce applications of China have shifted from companies to individuals. In May 2003, Alibaba Group founded Taobao and participated in the Customer to Customer (C2C) market. In December 2003, Huicong (HC) Network was

¹ Ali Research Institute is a new business knowledge platform that relies on the massive data of Alibaba Group, deepens the frontiers of small businesses, and brings together global business intelligence.

listed on the Hong Kong Growth Enterprise Market and became the first Business to Business (B2B) E-commerce listed corporation in China. In January 2004, Jingdong took part in E-commerce's field. In November 2007, Alibaba successfully listed on Hong's main board Kong. The state has also issued a series of major directive documents on E-commerce's development, creating a good policy environment for E-commerce's subsequent development. With network's popularity uses and the raise of on-line users, the application level of E-commerce transactions has also rapidly increased, becoming a new trading channel for a lot of corporations and individuals at the same time. More and more corporations are shifting from off-line to integration of off-line and on-line, such as on-line stores' emergence, the establishment of corporate E-commerce departments and the use of on-line banking. With on-line merchants' rise, E-commerce's application has also gradually expanded to the upstream supply chain, which has furthered the development and growth of E-commerce support services such as on-line payment and logistics.

(3) Third Stage

E-commerce has become essential infrastructure for the information economy. The rapid development of E-commerce has made the information as a core production factor more and more widely used in economic activities. As a result, the information penetration rate of business, industry and agriculture is improved, and people's consumption behaviours and habits are changed, and the form of the enterprise and the value what society created are updated. These have promoted social division of labour and cooperation, reduced transaction costs, and enabled social resources to be used more effectively, thus having a significant impact on traditional retail, manufacturing and logistics industries. More and more businesses and individuals are reducing their transaction costs and sharing business resources through an E-commerce-centric platform.

In July 2008, China became the world's largest Internet population. According to China Internet Information Centre (CNNIC), the number of Chinese Internet users reached 253 million at the end of June 2008, surpassing the United States for the first time and ranking first in the world. During the 2010 two sessions, former Premier Wen Jiabao clearly stated in the 2010 “Government Work Report” that it is necessary to strengthen the construction of infrastructure such as the trade circulation system and

actively develop E-commerce. This is also the first time that E-commerce has been proposed in the government work report of the National People's Congress. In December 2010, Dangdang² was listed on the New York Stock Exchange. In 2012, the brand discount network Vipshop was listed on the New York Stock Exchange, Taobao Mall changed its name to "Tmall" independent operation. Besides, the annual transaction volume of Taobao and Tmall exceeded 100 billion RMB in 2012, and the "double eleven" transaction volume reached 36.2 billion RMB.

(4) Fourth Stage

In 2013, E-commerce transactions of China exceeded 10 trillion RMB, and on-line retail transactions reached 1.85 trillion RMB, China has become first on-line retail market of the world. According to the "Network Entrepreneurship Employment Statistics and Social Security Research Project Report" released by the China Employment Promotion Association in February 2014, 9.62 million was reached by the number of direct employments in on-line stores, driving more than 1.2 million indirect employments and becoming a new growth point for employment. In April 2014, Jumei Premium, one of the big E-commerce corporations in China, was listed on the New York Stock Exchange (NYSE). In May, Jingdong Group officially listed on Securities Dealers' National Association Automated Quotations (NASDAQ). In the same year's September, Alibaba officially listed on the New York Stock Exchange with an issue price of US\$68, making the largest IPO for it in US history. In June 2014, the quantity of on-line shopping users of China arrived at 332 million, and more than 50% of Internet users used the Internet for shopping. Moreover, express delivery industry of China ranked first in the world, with almost 14 billion express delivery business.

The booming growth of on-line retail in China has advanced the development of production services such as on-line payment, logistics express, and on-line store operations. Since 2013, E-commerce infrastructure of China has grown more and more complete, and new business forms have been spawned based on it. This has affected and accelerated conventional industries' "E-commerce" and encouraged the overall transformation and upgrading of the economy.

² Dangdang, Vipshop, Tmall and Taobao are E-commerce company in China.

2.3 E-commerce's Business Mode

In China, E-commerce also penetrates into all aspects of the economy and society, infiltrates into the fields of study, work, life and consumption, and links customers, companies, financial institutions, logistics agencies, regulatory agencies and even government departments. Various kinds of forms of trading activities that were started on the Internet have promoted E-commerce's in recent years rapid development. E-commerce has been well applied to personal online shopping, family finance, even business operations and foreign trade. According to the transaction subject, there are several modes: business-to-business (B2B), business-to-customer (B2C), customer-to-customer (C2C), business-to-government (B2G), and online-offline (O2O). The main modes are B2B, B2C and C2C.

(1) B2B is an E-commerce activity that takes place between enterprises. It is the oldest and most developed model and the heart of E-commerce. Businesses exchange products, services and information over the Internet. The advantage of this mode is that it reduces procurement costs, inventory costs, saves turnaround time and expands market opportunities. At present, the B2B operating modes are mainly used by Alibaba, Shanghai Iron and Steel, HC, Global Sources and so on.

(2) B2C refers to suppliers selling goods and services directly to customers. This mode is typically based on online retail, which is also commonly referred to as commercial retail. By browsing the company's E-commerce site, consumers can preview, order, place orders and pay for products. Similar to e-retail, goods carriers transfer products or services to consumers through logistics or other distribution methods. Consumers can directly participate in the commodity exchange process. The commodities traded in the online store can be physical goods such as books, clothing, food, electronic appliances, automobiles, and also can be digital products such as software, movies, games, news, as well as distance education, online medical treatment, and travel arrangements. China's major B2C sites include Tmall, Jingdong, Vipshop, Suning Tesco, Amazon and Vanke.

(3) C2C is an E-commerce mode between individuals and individuals. This means that network service suppliers provide E-commerce transaction platforms and procedures for buyers and sellers through computers or network information technology so that individual users can conduct independent bidding, bargaining and

other trading activities on the trading platform. C2C E-commerce has a major impact upon day-to-day consumption and social production and life in the national economy and plays an significant role in encouraging relevant industries' development, enhancing regional competitiveness, and promoting regional economic development. At present, China's main C2C platforms include Taobao, Baidu, Tencent and eBay and Taobao has the largest market share.

2.4 Competitive Advantage of E-commerce in China

The emergence of E-commerce has brought about a virtual market so that buyers and sellers cannot be limited by time and space. The settlement method is no longer a traditional one-handed delivery method, nor is it a fixed trading place. Both parties can complete the transaction without meeting and can also get rid of the time limit and conduct round-the-clock transactions, thus providing more trading opportunities and improving trading efficiency (He, 2016).

(1) E-commerce creates a better consumption experience for consumers and offers a variety of personalized consumer needs, enabling consumers to access product information and enjoy quality service anytime, anywhere. From a company's point of view, E-commerce's emergence has accelerated the co-operation between upstream and downstream companies, supplied more job opportunities, and created a more efficient, convenient and economic environment for upstream and downstream firms in the sales chain and supply chain.

(2) E-commerce makes it faster and easier for companies to enter the international market, no longer subject to the high threshold of the past, but creating more conditions for enterprises. Enterprises can show their brand image to the world, regardless of time and space, to achieve maximum information sharing more efficiently and conveniently, so that the company can better and faster integrate into the competition of the international market. In addition, benefiting from the two-way interaction of the network and the rapid dissemination of information, enterprises can promote services and products faster and more widely, which is conducive for enterprises entering the international market and improving their competitiveness.

(3) E-commerce has created a new mode of operation for enterprises. Both sellers and buyers can complete the transaction by telephone, email, fax, internet, and

exchange relevant legal documents through electronic data interchange (EDI) on the Internet.

2.5 Reasons behind Development of E-commerce in China

It is inevitable that China's E-commerce market develops so rapidly (He, 2016) .

First of all, E-commerce has changed the way of trading that was restricted by position and fixed time completely, with employment and great commercial value potential. Society's whole has a more comprehensive and newer understanding of E-commerce at the same time. From point of view of the consumer, E-commerce provides consumers a convenient, secure and time-saving means to consume. From enterprises' standpoint, more and more companies are step by step growing from the beginning of E-commerce platforms' construction to deeper channels' construction. The government is also paying more and more attention on the issue of how E-commerce promotes faster economic and better development, for the reason that E-commerce's development is now more closely linked to macroeconomic indicators and social resources, and the government wants to achieve economic restructuring through E-commerce's development.

Second, China's E-commerce development system has gradually improved. From the E-commerce application platform established by traditional enterprises and the government covering all aspects of life to the network platform layer including the Internet and other network construction, and finally the construction of supporting systems such as logistics and payment. These industries that follow the development of E-commerce have laid a good foundation for the growth of E-commerce.

Third, the strategical role of E-commerce in China is getting more significant. The government hopes to promote the economy's development by promoting the modern service industry's development, to drive the economy through technological innovation, and to achieve the transformation of the economic structure. E-commerce is part of the modern service industry, which can stimulate domestic demand to promote consumption significantly, and it is also a way to promote economic development through technological innovation.

Fourth, the application of E-commerce in China involves various fields. Agriculture, transportation, finance, commerce, logistics, education, medical, tourism

and other industries continue to deepen and improve the application of E-commerce. At the same time, the wide application of E-commerce has also strengthened the links and cooperation of various industries.

2.6 China's E-commerce in Recent Years

At present, E-commerce of China is booming and has become a new driving force for economic development. In 2017, the national on-line retail sales that are raised by 32.2% year-on-year, a gain of 6 percentage points over 2016. Among them, physical goods' on-line retail sales accounted for 15% of consumer's overall retail sales goods, a rise of 2.4 percentage points over the previous year. Physical goods' contribution rate online retail to the total retail sales of social consumer goods that is reached for 37.9%, a rise of 7.6 percentage points over the previous year. The role of online retailing in encouraging expenditure has been further enhanced.

Also, in the context of the slow recovery of traditional international trade, cross-border E-commerce exports have increasingly become a new channel for Chinese goods to open up overseas markets. China has actively participated in the negotiation of E-commerce issues under the framework of multilateral trade mechanisms and regional trade arrangements such as APEC, SCO, G20, WTO, and promoted the establishment of the BRICS³ E-commerce working group and adopted the “BRICS E-commerce cooperation initiative”.

E-commerce accelerates the development of digital technology innovation and promotes the digital transformation of enterprises. The E-commerce platform uses digital technology to transform and upgrade the logistics platform. Unmanned Aerial Vehicle (UAV), unmanned warehouses and unmanned vehicles have begun to be applied, speeding up the efficiency and coverage of logistics express delivery. Based on the Internet, the company uses advanced technologies like artificial intelligence and big data to upgrade the sales, sales processes and production of goods, deepen the integration of offline experience, existing logistics and on-line services and promote the retail industry's development in the way of multi-scene and intelligence. For example, Alibaba, Jingdong, Suning and other online and offline convergent companies

³ BRICS is the acronym coined for an association of five major emerging national economies: Brazil, Russia, India, China and South Africa.

have actively established new digital retail formats in unmanned convenience stores, retail experience stores and online stores.

According to data from the National Bureau of Statistics of China, the national E-commerce transaction volume in 2017 reached 29.16 trillion RMB, a year-on-year increase of 11.7%. As shown in Figure 2, from 2007 to 2017, the scale of transactions in China's E-commerce market is increased. In 2007, the national E-commerce transaction volume was 2.17 trillion RMB, accounting for only 7.44% of the 29.16 trillion RMB in 2017. This deteriorated growth rate may indicate that China's E-commerce has reached its full potential and fully utilized and it has entered a stage of steady growth from the rapid development stage.

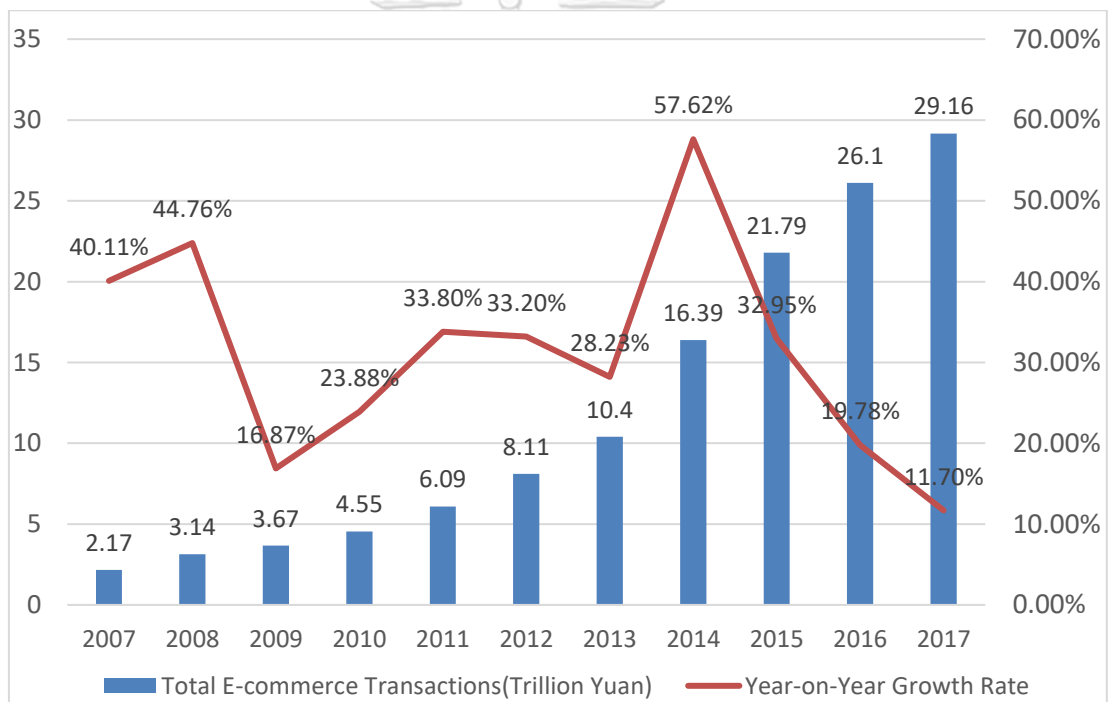


Figure 2. Total E-commerce Transactions and Its Year-on-Year Growth Rate

Although China's E-commerce has made great progress after nearly two decades of development, the problems of unbalanced development and insufficient development are still the main factors that restrict the high-quality development of E-commerce. The development of the eastern region is stronger than that of the western region, and there is a problem of regional imbalance. In terms of transaction scale, the provinces and cities in the eastern region account for two-thirds of the national total. Besides, the

development of industrial products is robust, and there are problems with category imbalance. Although the development of China's agricultural products E-commerce has been rapid in recent years, it is still in the initial development stage. The main problems are manifested in the lack of development of market entities, the lag of infrastructures such as logistics and distribution, the low degree of branding of agricultural products, the asymmetry of production and sales, and the shortage of talents and funds.



Chapter 3 Literature Review

3.1 Study of E-commerce

The amount of E-commerce sales can be affected by some factors. Ren and LU (2013) used a linear regression of ambiguity to forecast the volume of domestic E-commerce transactions. The model was established by the author from the way the independent variable is the clear value and the dependent variable is the symmetric fuzzy number, then tested the model's fitting degree, and finally carried on the empirical test on the variables affecting the E-commerce transaction amount. In the process of building the model, the relationship between the number of domain names, the number of websites, international export bandwidth, the number of Internet users and other E-commerce transactions were analysed, and empirical outcomes were obtained. Xu (2012) used empirical analysis to analyse the factors influencing the volume of E-commerce transactions. It can be seen from the empirical analysis that the volume of E-commerce transactions is affected through factors such as the number of Internet users, the number of on-line shopping, the number of domain names, and the number of E-commerce corporations. Wang (2014) used grey correlation analysis to analyse the factors affecting E-commerce transaction volume and concluded the relative influence of E-commerce transaction volume by calculating the relative, absolute and comprehensive correlation between main factors and influencing factors. J. Sun and Wei (2016) collected and analysed the number of Chinese domain names, the number of websites, the international export bandwidth, the number of Internet users and the number of E-commerce companies from 2003 to 2015. They used Eviews to measure and analyse the collected data, then concluded that the volume of E-commerce transactions in China is affected by the amount of Internet users, the number of websites, the international export bandwidth and the number of E-commerce firms. The number of websites contributes the most to E-commerce transactions, followed by the amount of Internet users, the number of E-commerce companies and international export bandwidth.

The development of E-commerce is related to the surrounding environment. He (2016) concentrates on E-commerce development's core issues, focusing on the growth

of China's E-commerce and regional differences. In addition, through the regression analysis of the E-commerce development characteristics of 31 provinces and cities in China from 2013 to 2014, the result showed that E-commerce has the highest correlation with economic development level. In regional and economically developed regions, under the favourable conditions of E-commerce developments, E-commerce has become a strong driving force for the regional economy and has built a mutually reinforcing growth procedure. G.Martinsons (2002) concluded that the prospects for E-commerce in mainland China are connected with the development of the principles and infrastructure fundamental to a modern market economy.

E-commerce will face some problems in the development process. P. Sun and Li (2014) believed that E-commerce is a strategic part in economic development. However, in the growth of E-commerce, there are problems such as inadequate supervision and imperfect industrial trading chain, which hinders the development of E-commerce industry. Ye (2010) pointed out that the transaction status of E-commerce in China is growing rapidly, but it also faces problems of enterprise management, payment security, laws and regulations, and should gradually regulate the order of the E-commerce market and improve the E-commerce supervision system. H. Liu and Song (2012) analysed the issues existing in E-commerce's development and pointed out that E-commerce infrastructure of China is backward, mobile E-commerce data processing technology is not mature, and regulations and laws are not perfect, which affects E-commerce industry's development. Jia (2017) discussed the problems faced by China's E-commerce development and proposed corresponding solutions.

E-commerce will influence consumer decisions. Pan (2016) constructed a theoretical model from the perspective of maximizing consumer utility and driving the influence of conductor development on consumer shopping decisions. By taking the physical strength, energy, time and other consumption of consumers in traditional market shopping as well as the specific cost of E-commerce platform shopping as a parameter, the E-commerce platform is introduced to influence the consumption of residents. According to the model, the emergence of E-commerce platform will change the number of goods purchased by consumers and total consumption expenditure, but the degree of influence will change according to the price elasticity of commodity

demand. In other words, the impact of E-commerce development on household consumption is different in every part of the product market. Through research, it is concluded that the development of E-commerce promotes the consumption of Chinese residents, and the promotion of E-commerce platform to consumption is reflected in the effective matching of the needs of buyers and sellers, which makes the long-tailed goods form a huge market in the network.

E-commerce can promote urbanization. In the past two years, two independent issues of E-commerce and urbanization have been studied. Q. Chen and Lv (2014) and others analysed the role of E-commerce in promoting new urbanization from four aspects following, overall coordination, transformation and upgrading, compact integration, and ecological civilization. Cui, Wang, and Li (2014) and others believed that E-commerce is an essential means to promote urbanization, refers to the problems that arise in the process of urbanization development, and proposed the specific application of E-commerce in the development of urbanization. In discussing the relationship between E-commerce and urbanization, Ge (2013) believed that E-commerce can promote urbanization by providing more employment opportunities, increasing people's income and changing the concept of consumer consumption. Zhao (2015) elaborated on the promotion of E-commerce to industrial clusters, industrial layout and industrial structure, and studied how E-commerce promotes urbanization through industrial clusters.

3.2 E-commerce and Economic Growth

About the impact of E-commerce on the macroeconomy, scholars in China and other countries have also done much research.

Some people have published books on E-commerce and combined economics to analyse the economic impact of E-commerce. VanHoose (2011) combined economics with E-commerce. He said in *E-commerce Economics* that he analysed the knowledge of E-commerce from various fields, including many fundamental theories of economics, mainly public economics and financial economics.

E-commerce promotes economic growth by reducing costs and increasing efficiency. Schneider (2006) made his own opinion. He believed that E-commerce has

a close connection with the economic structure of the environment, which means that the development of E-commerce is affected by the environment. In "E-commerce", he analysed business and technical problems in business, determines the opportunities of E-commerce by examining the value chain of enterprises, and analysed various E-commerce models to analyse the goal of various E-commerce - reducing costs. Zhang and Wang (2007) used emerging classical economic theory and general equilibrium models to conclude that economic growth is linked to the development of E-commerce. Especially after reducing costs, E-commerce has greatly improved transaction efficiency and improved the corresponding social division of labour and productivity.

E-commerce promotes economic growth by stimulating consumption. Georgiou (2009) thinks that E-commerce boosts sales (and therefore consumption), that in turn enhances corporation performance, thus leading to ultimately economic growth. He took panel data from Eurostat, cover Western European nations for the period 2003 -- 2006, and led to the conclusion electronic commerce (E-commerce) has an econometrically positive effect on economic growth at the country level. Based on the GDP accounting through expenditure approach, S. Liu (2013) analyses and expounds E-commerce development's impact mechanism to the national economic development. This paper uses an econometric model to obtain empirical study between economic growth and E-commerce development using Chinese E-commerce development's latest data to come to the conclusion that E-commerce can encourage economic growth.

E-commerce can increase the productivity of the country. Brookes and Wahhaj (2000) used econometric models to estimate the role of B2B E-commerce in the economic development of the United States, the United Kingdom, Germany, France, and Japan and pointed out that B2B E-commerce between 2001 and 2010 increased the GDP of these countries by 0.25% per year. In 2002, a study by Cisco Systems Inc. showed that between 1995 and 2010, US E-commerce increased its average annual growth rate from 1.2% to 2.1%. From 2000 to 2010, E-commerce increased the average annual growth rate of EU production from 1.3% to 1.7% (www.netimpactstudy.com).

E-commerce has become a new factor in promoting economic growth. Fan (2010) believed that E-commerce is a new growth point for economic development. This paper analysed the mechanism of E-commerce development to promote national economic

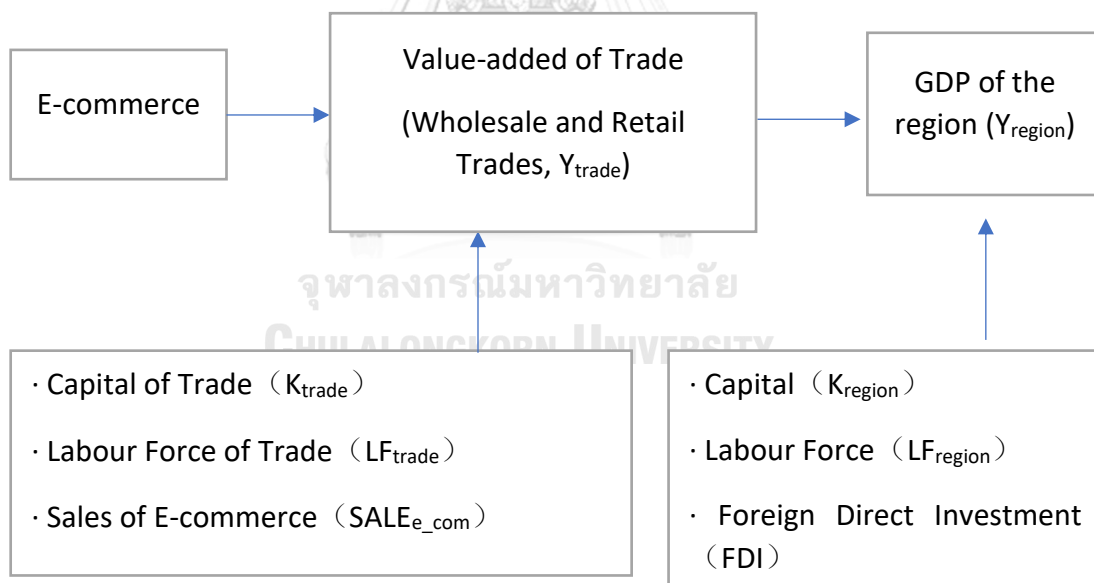
growth from four aspects: consumption, investment, government procurement and net export. It used econometrics related research and quantitative analysis of multiple linear regression models, the number of domain names, the number of E-commerce companies and the number of online shoppers are positively correlated with GDP growth, so there is a significant positive correlation between E-commerce and economic growth. Huang (2010) introduced the E-commerce factor into the Cobb-Douglas production function and concluded that E-commerce is a new economic growth point and a turning point in economic development. Yang, Zhou, and Li (2011) also introduced the E-commerce index into the Cobb-Douglas production function, formed the Cobb-Douglas production function with E-commerce index, and concluded that E-commerce is a new impetus for economic growth. However, the main driver of China's economic growth is an investment in capital and labour. Therefore, the task of transforming the economic development mode is arduous. However, Lu, Jia, and Yao (2012) believe that the domain names, telecommunications and employment of other information dissemination industries are not crucial for economic growth, while the number of Internet users, information transfer and computer software practitioners' wage and freight volume variables have a positive impact on economic growth.

Dong (2006) and Gui (2011) detailed the mechanisms and principles of E-commerce to promote economic development in their papers and discussed the impact of E-commerce on economic development from a qualitative and quantitative perspective. X. Chen (2011) used the theories of neoclassical economics and emerging classical economics to optimize the inframarginal analysis model, evaluate the contribution of E-commerce to economic growth, and concluded that E-commerce and economic growth are not linear but rather “U” type relationship. In the initial stage of E-commerce, we should pay attention to the proportion of E-commerce transactions in the total transaction volume; When E-commerce enters the rapid development stage, we should pay attention to the impact of E-commerce on the economy and determine the development strategy of E-commerce.

Chapter 4 Conceptual Framework

It is widely trusted that economic growth refers to a growth in the services and products of a country or region, which is reflected in the rise in the gross domestic product (GDP). However, this understanding is not very comprehensive and scientific, and an accurate explanation of economic growth should be elaborated from two aspects. First, whether it is the actual added value of the total amount of products and services produced during a specific period or its actual growth rate. Second, whether it increases potential production capacity of a country or region over a certain period. In macroeconomics, E-commerce is expected to stimulate capacity of production so that the economy can grow much more.

From a global perspective, as the growth of production capacity depends mainly on a country's natural resources, human resources and capital accumulation, and technological level, economic growth also depends on an increase in various factors that promote production.



An increase in labour force can stimulate economic growth which can be achieved by increasing the total labour force of the same number of workers and the amount of productive labour. If the country has more investment - capital inflow, an increase in the capital also can generate economic growth for that country. Foreign direct investment inflows have a positive impact on the economy and can accelerate economic growth, especially for developing countries (Johnson, 2006).

What is more, E-commerce can boost national economic growth by increasing consumption, investment, government procurement, and net exports.

Firstly, E-commerce provides people a wide variety of products people's needs for material culture to a greater extent. Consequently, more and more consumers are eager to shop on the Web and push consumer spending up. The development of internet, logistics E-commerce and computer will generate more job opportunities and encourage consumption. Convenient and efficient E-commerce can break through the limitations of space and time, attracting consumers and enterprises significantly, and economic development is promoted by the two sides jointly. On-line stores' scale will gradually grow, and consumers will switch more traditional face-to-face direct transactions to on-line transactions, thereby promoting circulation and consumption. E-commerce's rapid evolution is bound to lead to a substantial boost in relevant electronic products' consumption and promote the computer Internet industry's economic development.

Secondly, E-commerce is a new type of business operation. After more than ten years of development in China, it has gradually been accepted and become one of the hot subjects in the industry. E-commerce's growth requires corporations to increase their fixed capital investment in infrastructures such as inventory, warehouses, transportation and logistics. E-commerce will encourage on-line advertising's development and stimulate enterprises' investment requirement for advertising. In the aspect of the global financial turmoil in 2008, E-commerce of China has made use of its advantages and has become an essential option for companies to survive in the economic winter. Investment institutions are thus paying more and more attention to the Chinese E-commerce market and are increasingly confident in their development prospects.

Thirdly, with the continuous development of E-commerce, the related road and vehicle demand will increase, and government procurement in this area will increase accordingly. The increased demand for these ancillary services enables consumers to respond quickly to price changes, leading to market volatility and impact on economic development. Besides, due to the strict requirements of E-commerce for network data security, corporate business credit and personal credit, the government will increase

related procurement expenditures to ensure the regular operation of E-commerce and thus can play a significant role in the growth of the national economy.

Fourthly, E-commerce is a profound revolution in international trade. The world market's reconstruction, the innovation of international trade management methods, the expansion and deepening of international division of labour, and the development of domestic business has been greatly pushed by the full application of E-commerce in international business. With rapid growth of network technology, E-commerce has shown its advantages increasingly and will become the mainstream of international import and export trade soon. Application of E-commerce can enable a country to take part more effectively in initiative, international market competition and gain benefits in international competition, thereby gaining greater profits in process of economic globalization and promoting healthy and rapid development of the home economy.

The study employs a framework of the production function to examine the contribution of E-commerce. The aggregate production function is written in the Cobb Douglas functional form as written below.

In the level of the regional, GDP (Gross Domestic Product) is a function of the labour force, total investment in fixed assets, FDI and sale of E-commerce.

$$Y_{\text{region}} = f(\mathbf{LF}_{\text{region}}, \mathbf{K}_{\text{region}}, \mathbf{FDI}, \mathbf{Sale}_{\text{ecom}})$$

From the perspective of sector, GDP (Gross Domestic Product) is a function of labour force, total investment in fixed assets and sale of E-commerce.

$$Y_{\text{trade}} = f(\mathbf{LF}_{\text{trade}}, \mathbf{K}_{\text{trade}}, \mathbf{Sale}_{\text{ecom}})$$

Table 1 below describes the data used in the study in more details.

Table 1. Data used in the Estimation

Variables	Measurement of Variables	Expected Output	Explanation of Expected Output
Y_{region} (GDP of region)	Gross Domestic Product of each selected region	+	An increase in regional GDP can accelerate the economic growth of the country.
LF_{region} (Labour Force)	The employed person in each region	+	An increase in capital will generate economic growth for that region as well as labour and higher population growth rate can drive greater potential savings and a higher potential growth rate
K_{region} (Total investment in fixed asset)	Total Investment in Fixed Assets in each region	+	Foreign direct investment inflows have a positive impact on the economy and can accelerate economic growth, especially for developing countries.
FDI (Foreign Direct Investment Inflows)	Value of Foreign Direct Investment Actually Utilized	+	As a part of a contribution to GDP, an increase of value-added in the trade sector can generate national economic growth.
Y_{trade} (Value-added in trade sector)	Value-added of Wholesale and Retail Trades in each selected region	+	
LF_{trade} (Employment of trade in China)	Employment of wholesale & retail trade in China	+	An increase in capital will generate economic growth for that country as well as labour can drive more considerable potential savings and a higher potential growth rate
K_{trade} (Total investment in the fixed asset in wholesale and retail trade)	Total Investment in Fixed Assets, Wholesale and Retail Trades, in each selected region	+	
$Sale_{e.com}$ (The amount of E-commerce transaction)	The amount of E-commerce sale in each region	+	An increase in sale refers to consumption growing which can lead to an increase of output

Note: all variables are measured in constant price.

Chapter 5 Research methodology

5.1 Details of Data

GDP is an essential indicator of the degree of economic development of region or a country. It represents the sum of the total value of all final products and services created by an area or a nation over a period of time. In recent years, E-commerce has grown quickly, but the relevant statistics are not complete. Therefore, different organizations have different data calibers, which makes the data of some indicators may be inaccurate when collecting data. E-commerce in this study is just measured by the total regional transaction volume due to the limitation of standard data on the development level of E-commerce.

The macro and E-commerce data in this paper mainly are from the China E-commerce Market Data Monitoring Report, Statistics' National Bureau and E-commerce report of China (2012-2016). The contribution of E-commerce to the economy is measured in terms of GDP. Taking real GDP as the dependent variable and the amount of E-commerce transaction as the independent variable, Eviews analysis software is utilized to analyse E-commerce's contribution on sectoral economics and macroeconomics by using panel data with fixed effect.

All variables are in log form and GDP and capital (K) variables of the macroeconomy and sectoral economy in this study are adjusted to be constant price by introducing the price index. The region is referred to province level and trade is referred to the wholesale and retail trade sector in China in this study.

5.2 Samples of Study

In China, there are four economic zones by geographic region, namely the western economic zone, the eastern economic zone, the central economic zone and the northern economic zone. The gross national product and population of the eastern economic zone account for more than half of GDP and the total population. According to the data from China's E-commerce Report (2017), the amount of E-commerce transaction accounted for 74.8% of the country in Guangdong Province, Zhejiang Province, Shanghai, Beijing and Jiangsu Province. This paper chooses seven eastern economic zones which include 5 free trade zones, 1 eastern economic zone and 1 special

economic zone in China to investigate the contribution of E-commerce on the economy, which are Guangdong Province, Zhejiang Province, Shanghai, Beijing⁴, Jiangsu Province, Fujian Province and Hainan Province.

5.3 The Model

To examine the growth, the study set up two models to be tested: one is for the aggregate (regional) economy and the other is for the trade sector. In macroeconomics, economic growth is usually stimulated by E-commerce and increases in production either in terms of total economic output or the per capita output. In general, output growth is explained by a country's natural resources, human resources and capital accumulation, technological progress, and other exogenous factors, if any.

The aggregate production functions are employed to estimate the impact of E-commerce from both the aggregate economy level and the sectoral level as showed in Equation (1) and (2).

The model of economy-wide expressed in terms of gross regional products is showed as in Equation (1).

$$\begin{aligned} & \ln(Y_{region_{it}}) \\ &= \beta_0 + \beta_1 \ln(LF_{region_{it}}) + \beta_2 \ln(K_{region_{it}}) + \beta_3 \ln(FDI_t) + \beta_4 \ln(Sale_{ecom_{it}}) \\ &+ \varepsilon_{it} \end{aligned} \tag{1}$$

Where Y_{region} is regional GDP;

LF_{region} is regional employment;

K_{region} is regional total investment in fixed asset;

$Sale_{ecom}$ is the amount of regional E-commerce transaction.;

FDI is foreign direct investment inflows in China.

⁴ Shanghai and Beijing are Direct-administered municipalities of China which have the same rank as provinces, and form part of the first tier of administrative divisions of China.

For trade sector in particular, the model is shown in Equation (2) below. Here, the trade sector refers to wholesale and retail trade of each region at time t.

$$\ln(Y_{trade_{it}}) = \beta_0 + \beta_1 \ln(LF_{trade_{it}}) + \beta_2 \ln(K_{trade_{it}}) + \beta_3 \ln(Sale_{ecom_{it}}) + \varepsilon_{it} \quad (2)$$

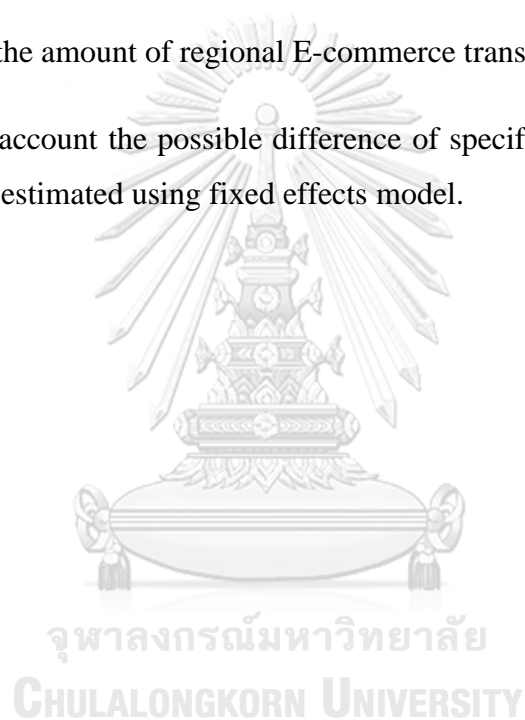
Where Y_{trade} is regional value added of wholesale and retail trade;

LF_{trade} is regional employment of wholesale and retail trade;

K_{trade} is regional total investment in fixed asset in wholesale and retail trade;

$Sale_{ecom}$ is the amount of regional E-commerce transaction.

Taking into account the possible difference of specific effect, Equation (1) and Equation (2) were estimated using fixed effects model.



Chapter 6 Research Results and Discussion

6.1 Research Results

The results of estimation will be presented in separate section as follow.

6.1.1 Regional Economy

$$\ln(Y_{region_{it}}) = 1.807309 + 0.080752\ln(LF_{region_{it}}) + 0.100394\ln(K_{region_{it}}) + 0.293589\ln(FDI_t) + 0.235135\ln(Sale_{ecom_{it}}) \quad (3)$$

(SE) (1.559098) (0.025208) (0.036037)

$\widehat{\beta}^*$ 0.006989434 0.009643402

t-Statistic 1.159202 3.203463 2.785870

(SE) (0.114884) (0.014265)

$\widehat{\beta}^*$ 0.004748534 0.022278578

t-Statistic 2.555530 16.48342

F-statistic is 15395.04.

Remark: $\widehat{\beta}^*$ is standardized coefficient.

Fixed effect

BJ (Beijing)	-0.318389
SH (Shanghai)	-0.142585
ZJ (Zhejiang)	0.101221
GD (Guangdong)	0.515473
JS (Jiangsu)	0.587218
HI (Hainan)	-1.328445
FJ (Fujian)	-0.000453

To estimate E-commerce's impact on the labour and capital productivity of the region, we introduce the interaction term to do the test, results are shown in equation (4).

Regional model with Interaction terms

$$\ln(Y_{region_{it}}) = 0.942243 + 0.045112\ln(LF_{region_{it}}) + 0.206158\ln(K_{region_{it}}) + 0.306545\ln(FDI_t) + 0.288113\ln(Sale_{ecom_{it}}) + 0.004840\ln(Sale_{ecom_{it}}) * \ln(LF_{region_{it}}) - 0.010215\ln(Sale_{ecom_{it}}) * \ln(K_{region_{it}})$$

(SE) (1.492553) (0.421462) (0.283717)

t-Statistic 0.631296 0.107036 0.726634

(SE) (0.102068) (0.021486)

t-Statistic 3.003350 13.40914

(SE) (0.040890) (0.028511)

t-Statistic 0.118356 -0.358284

F-statistic is 14638.16.

Fixed effect

BJ (Beijing)	-0.312371
SH (Shanghai)	-0.133013
ZJ (Zhejiang)	0.098774
GD (Guangdong)	0.509762
JS (Jiangsu)	0.573853
HI (Hainan)	-1.309046
FJ (Fujian)	-0.013289

From the results above, there are insignificant results found on both of the interaction terms which means that the ecommerce activity does not give significant change to capital productivity and labour productivity.

For the economy wide, the study found that all variables are positive and significant to the growth of output, as expected.

The results show that from 2008 to 2016, every 1% gain in the E-commerce transaction volume of each province will bring about a growth of 0.24% in GDP, which implies that the E-commerce transaction volume has an important and positive effect on the economic growth. The standardized coefficient of E-commerce (0.022278578) is larger than the standardized coefficient of capital (0.009643402), E-commerce activity can influence relatively larger on GDP than the others.

6.1.2 Estimated Sectoral Model

E-commerce provides the entire society with a large number of employment opportunities. It is still an essential option for entrepreneurial innovation and is welcomed by the younger generation. With the expansion and continuous development of E-commerce, employment's various new forms have gradually emerged, and a broader job market has come out, which has become one of increasing employment's important means in various regions. "E-commerce plays an important role in improving the employment situation in the region, raising people's income and improving people's living standards" (He, 2016).

According to China E-commerce Research Center Monitoring Data (2017), "The number of employed people (including logistics express, marketing and training) indirectly driven by E-commerce has gone beyond 25 million as of December 2017, over 3.3 million people are directly hired by E-commerce service corporations (including startups, E-commerce platforms, E-commerce sellers and service providers) (see Figure 3). " As more and more SMEs expand their application areas and the depth of E-commerce, and further enlarge E-commerce's scale, it will increase more job opportunities.

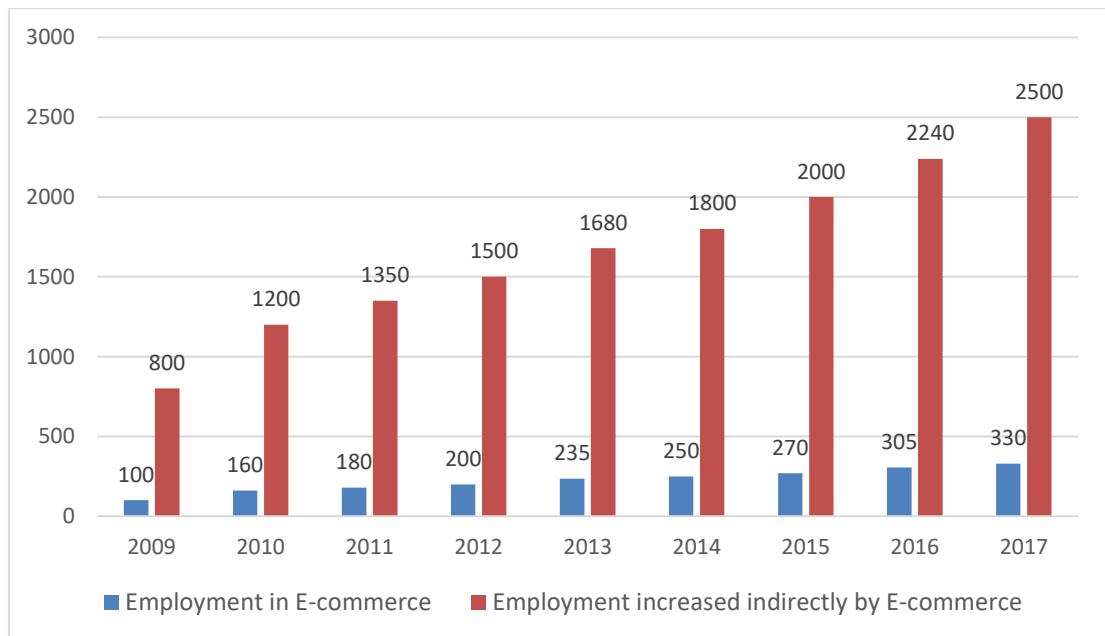


Figure 3. Employment in E-commerce and employment increased indirectly by E-commerce

Then, we try to do the examination of role of E-commerce on the trade sector in particular. So, the study estimated Equation (2) and the results as shown in Equation (5).

$$\ln(Y_{trade_{it}}) = 3.782333 + 0.233388\ln(LF_{trade_{it}}) + 0.014508\ln(K_{trade_{it}}) + 0.303563\ln(Sale_{ecom_{it}}) + \varepsilon_{it} \quad (5)$$

(SE)	(0.516876)	(0.112680)	(0.030658)
$\hat{\beta}^*$		0.015616036	0.001536725
t-Statistic	7.317686	2.071255	0.473207
(SE)	(0.036203)		
$\hat{\beta}^*$	0.020162696		
t-Statistic	8.385019		

F-statistic is 2847.625.

Remark: $\hat{\beta}^*$ is the standardized coefficient.

Fixed effect

BJ (Beijing)	-0.151373
SH (Shanghai)	0.109946
ZJ (Zhejiang)	0.015568
GD (Guangdong)	0.279676
JS (Jiangsu)	0.448206
HI (Hainan)	-1.013670
FJ (Fujian)	-0.235894

Then as the same with regional economy, we want to test the contribution of E-commerce on the productivity of labour and capital in trade sector and to estimate whether the impact of E-commerce on economic growth is different in the trade sectors with various labour input and capital input, so this study uses interaction term to do the test. The results are shown in equation (6) and equation (7).

Sectoral model with interaction terms (1)

$$\ln(Y_{trade_{it}}) = -0.427323 + 1.226030\ln(LF_{trade_{it}}) - 0.222028\ln(K_{trade_{it}})$$

$$(SE) \quad (1.787115) \quad (0.534491) \quad (0.219094) \quad (6)$$

$$t\text{-Statistic} \quad -0.239113 \quad 2.293825 \quad -1.013393$$

$$+0.640453\ln(Sale_{ecom_{it}}) - 0.091555\ln(Sale_{ecom_{it}}) * \ln(LF_{trade_{it}})$$

$$(SE) \quad (0.111561) \quad (0.041340)$$

$$t\text{-Statistic} \quad 5.740814 \quad -2.214677$$

$$+0.030686\ln(Sale_{ecom_{it}}) * \ln(K_{trade_{it}}) + \varepsilon_{it}$$

$$(SE) \quad (0.024383)$$

$$t\text{-Statistic} \quad 1.258491$$

F-statistic is 1731.859.

Fixed effect

BJ (Beijing)	-0.030611
SH (Shanghai)	0.177477
ZJ (Zhejiang)	-0.051240
GD (Guangdong)	0.143803
JS (Jiangsu)	0.265626
HI (Hainan)	-0.603050
FJ (Fujian)	-0.291746

From the results of equation (6), there is an insignificant result of capital input which means there is no different effect of capital input on output of trade sector due to E-commerce.

Therefore, to improve efficient estimation, we remove the interaction term of sale of E-commerce and capital in trade sector to do the estimation and the results are shown in equation (7).

Sectoral model with interaction terms (2)

$$\ln(Y_{trade_{it}}) = 1.354255 + 0.636482\ln(LF_{trade_{it}}) + 0.045605\ln(K_{trade_{it}})$$

$$(SE) \quad (0.900158) \quad (0.160713) \quad (0.018039) \quad (7)$$

$$t\text{-Statistic} \quad 1.504463 \quad 3.960365 \quad 2.528096$$

$$+0.538812\ln(Sale_{ecom_{it}}) - 0.041494\ln(Sale_{ecom_{it}}) * \ln(LF_{trade_{it}})$$

$$(SE) \quad (0.092815) \quad (0.014141)$$

$$t\text{-Statistic} \quad 5.805207 \quad -2.934334$$

F-statistic is 2783.106.

Fixed effect

BJ (Beijing)	-0.107591
SH (Shanghai)	0.137761
ZJ (Zhejiang)	-0.015697
GD (Guangdong)	0.244940
JS (Jiangsu)	0.377254
HI (Hainan)	-0.854550
FJ (Fujian)	-0.277861

In the trading sector, the study found all variables playing a significant and positive role in the growth of wholesale and retail trade sector.

Similar to the finding in the aggregate economy, E-commerce has a big influence on the output of trading sector positively and significantly, said that every 1% increase of E-commerce's sale would lead to an increase of 0.54% in the output in the trading sector. The results may imply that E-commerce is becoming one of the main factors to stimulate the productivity of trading sector which is similar to current situation and position of E-commerce in China.

What's more, from the results in Equation (7), we also can know that E-commerce activity can not only create higher labour productivity in trade sector, it can also help increase output of trade sector significantly.

In comparison, the coefficient of capital investment is the smallest relative to the other factors. Due to the limitation of data, K_{trade} here is proxied by total investment in fixed asset in wholesale and retail trade instead of being the capital stock. Most of all, the wholesale & retail trade sector is widely known as a labour-intensive production technique sector in an economy, the role of capital is therefore relatively little.

6.1.3 Comparison of Contribution of E-commerce to Regional and Sectoral Output

From the results of Equations (3) and (7), we can see that improvements of output due to E-commerce activity in trade sector at 53% which is larger than the E-commerce sale effect on the aggregate level, about 23.5%. We can think of E-commerce as a greater contribution to the trade sector because regional economic growth is contributed by the output of multiple sectors and not just by one trade sector. This result is also in line with reality.

6.2 Calculation of E-commerce Contribution on Economic Growth

Finally, we calculate the factor contributions to growth. This paper calculates the growth of output and then calculates the contribution of E-commerce and other factors from the perspective of regional economic and trade sectors respectively. This is to discuss the impact of E-commerce on the economy.

For the regional economy, as shown in Table 2 below, Beijing's output growth rate in 2016 was 7.5%, with the highest contribution rate of E-commerce, 2.39%, and other unknown contribution rate of 3.92%, while labour, capital and foreign direct investment contributed only 1.19%. In 2016, the economy of Shanghai and Zhejiang increased by 6.39% and 6.17% respectively, of which E-commerce contributed 1.74% and 1.62% respectively. The situation in Guangdong and Jiangsu is similar to that in Shanghai and Zhejiang, with output growth of 6.65% and 6.79% respectively, of which 1.88% and 1.96% are contributed by E-commerce. In 2016, Hainan's economy grew by 5.33%, of which 1.21% came from E-commerce, and the biggest contribution came from other factors. The performance of Fujian Province is also very prominent, with an economic growth rate of 7.14% contributed by E-commerce at 2.17%.

Table 2. Calculation of contribution of factor inputs to growth (2016) _Economy Level

Calculation of contribution of factor inputs to growth (2016) _Economy Level				
Provinces	Growth of Output	Due to		
		E-commerce	LF&K&FDI	Others
BJ	7.50%	2.39%	1.19%	3.92%
SH	6.39%	1.74%	0.86%	3.79%
ZJ	6.17%	1.62%	0.80%	3.75%
GD	6.65%	1.88%	0.93%	3.84%
JS	6.79%	1.96%	0.97%	3.86%
HI	5.33%	1.21%	0.60%	3.52%
FJ	7.14%	2.17%	1.08%	3.90%

From the perspective of E-commerce on the overall economic development (Table 3), E-commerce in those 7 regions has contributed about one-third on average to overall economic development. Beijing has the highest contribution rate of 31.90%, followed by Fujian Province, Jiangsu Province and Guangdong Province, with 30.38%, 28.89% and 28.30% respectively.

The overall contribution of E-commerce to the economy of Shanghai and Zhejiang Province is similar, with 27.18% and 26.22% respectively. The overall economy of Hainan Province has been boosted by E-commerce by 22.68%. Although this value is smaller than in other areas, it cannot be ignored. As one of China's major tourist provinces, tourism is its main economic pillar, but E-commerce can bring nearly one-third of the economic contribution has been very good.

Table 3. Calculation of contribution of factor inputs to growth (2016) _Economy Level (at 100%)

Calculation of contribution of factor inputs to growth (2016) _Economy Level (at 100%)			
Provinces	Due to		
	E-commerce	LF&K&FDI	Others
BJ	31.90%	15.80%	52.31%
SH	27.18%	13.46%	59.35%
ZJ	26.22%	12.99%	60.79%
GD	28.30%	14.02%	57.69%
JS	28.89%	14.31%	56.80%
HI	22.68%	11.23%	66.09%
FJ	30.38%	15.05%	54.58%

In the trade sector, although other factors have a more significant impact on the final output, E-commerce has also promoted trade development to varying degrees, as shown in Table 4 and Table 5 below. In 2016, the output of the Beijing and Guangdong trade sectors fell by 3.49% and 2.26% respectively, of which 0.23% and 0.09% came from E-commerce, which is the smallest part. The output of the trade sectors in the other five regions has increased to varying degrees, and the growth brought by E-commerce has made a positive contribution although it is relatively small.

The highest output growth of the trade department of Jiangsu Province is 6.77%. The output of the trade department of Zhejiang Province and Hainan Province is 5.12% and 5.82%, of which 0.49% and 0.63% are driven by E-commerce. The output of the trade departments of Shanghai and Fujian Province has increased by more than 3%. Out of growth of output on 3.83% in Shanghai's trade sector, 0.27% came from E-commerce, while Fujian's trade sector's output growth rate was 3.44%, of which E-commerce contributed 0.22%.

From the overall situation of the trade sector, the output of the trade sector in Beijing and Guangdong Province declined in 2016, with 6.48% and 4.19% of the decline coming from E-commerce. In the other five regions, E-commerce promotes the development of the trade sector to varying degrees, and the highest is Jiangsu Province where E-commerce has contributed 12.56% to trade output.

Table 4. Calculation of contribution of factor inputs to growth (2016) _Trade sector

Calculation of contribution of factor inputs to growth (2016) Trade sector				
Provinces	Growth of Output	Due to		
		E-commerce	LF&K	Others
BJ	-3.49%	-0.23%	-0.19%	-3.07%
SH	3.83%	0.27%	0.23%	3.33%
ZJ	5.12%	0.49%	0.41%	4.22%
GD	-2.26%	-0.09%	-0.08%	-2.08%
JS	6.77%	0.85%	0.71%	5.20%
HI	5.82%	0.63%	0.53%	4.66%
FJ	3.44%	0.22%	0.19%	3.04%

Table 5. Calculation of contribution of factor inputs to growth (2016) _Trade sector (at 100%)

Calculation of contribution of factor inputs to growth (2016) _Trade sector (at 100%)			
Provinces	Due to		
	E-commerce	LF&K	Others
BJ	-6.48%	-5.45%	-88.07%
SH	7.10%	5.97%	86.92%
ZJ	9.50%	7.99%	82.52%
GD	-4.19%	-3.52%	-92.28%
JS	12.56%	10.56%	76.88%
HI	10.81%	9.09%	80.10%
FJ	6.39%	5.37%	88.24%

We can notice that E-commerce plays a relatively larger role on output growth when compare to the other input factors in aggregate economy.

6.3 Government Actions on the Development of E-commerce

In Beijing, the business integration of online and offline enterprises has been continuously improved, and more and more offline physical stores have begun to provide online services and settled in major E-commerce platforms. “In 2016, among the 77 wholesale and retail enterprises with a quota of more than the above, 13 of them have launched the online retail business. The products involved in food, tea, clothing, shoes, hats and books, and realized online retail sales of 470 million RMB” (2016 China E-commerce Report).

More and more service areas have proposed a new model of "Internet +" life service industry, from logistics and distribution, housekeeping services, property maintenance to smart retirement and recycling of renewable resources. Through the network platform, enterprises provide a variety of personalized services, satisfy a large part of the service needs, and bring great convenience to people's lives.

Cross-border E-commerce continues to innovate and develop a regulatory model to achieve convenient development. The Beijing Post Processing Centre has become the main channel for the general export of cross-border E-commerce ports, enabling 24-hour convenient customs clearance. According to the 2016 China E-commerce Report, “In 2016, the city’s cross-border E-commerce retail import value was 340 million RMB (up 8.4 times compared with 2015), and the postal packet export value was included in the customs statistics value of 840 million US dollars.” In 2016, Beijing actively responded to the national “Internet + Circulation” action plan, formulated corresponding E-commerce cross-border development plans, strengthened policy support for E-commerce development, and actively guided enterprises to set up cross-border E-commerce O2O experience stores which allows consumers to purchase different types of goods from different countries without going abroad, and vigorously promote the development of cross-border E-commerce. What is more, “2016 China (Beijing) E-commerce Conference” was held in Beijing to support enterprises in exploring overseas markets. Nearly 100 traditional enterprises were connected with important E-commerce platforms in Beijing to promote the online and offline development of the retail industry.

“ In 2016, Shanghai has 3 E-commerce transactions with 100 billion-level

enterprises, covering the city's steel trading platform and tourism service platform; 15 billion-level, including commodities, network zero-cross-border E-commerce and many other Field" (2016 China E-commerce Report). In Shanghai, traditional industries have accelerated their online business, and online companies have accelerated the pace of offline business development. Various types of E-commerce pilots have been launched one after another, and online and offline integration has developed better and better. Besides, Shanghai's mobile electronic payment has become more and more popular. Electronic payment methods such as Alipay and WeChat payment have covered more than 90% of the city's physical business enterprises. As of 2016, Shanghai has 7 national and municipal E-commerce demonstration parks. Sound and sound policy support and related business training promote the healthy and rapid development of E-commerce in Shanghai.

Jiangsu Province attaches great importance to E-commerce brands in E-commerce development, organizes various related conferences, forums and E-commerce related training, and the government strongly supports the promotion and construction of E-commerce, which creates a positive and healthy atmosphere for E-commerce development. "In 2016, 38 E-commerce demonstration towns and 48 E-commerce demonstration villages were established in the province (2016 China E-commerce Report)", and E-commerce gradually formed agglomeration development.

Zhejiang Province can be regarded as the leader of China's E-commerce. The proportion of SMEs on the Internet, the service income of B2B platform, and the transaction volume of C2C integrated trading platform ranked first in the country in 2016. The scope of E-commerce application extends from urban to rural areas, and it promotes agricultural product sales and farmers' consumption. According to the 2016 China E-commerce Report, as of 2016, there are 506 "Taobao Villages" and 51 "Taobao Towns" in the province, which increased by 80.7% and 155% respectively, accounting for 38.6% and 37.8% of the national total, respectively, and continued to lead the country.

Also, the legal support system for E-commerce has become more and more perfect, and E-commerce legislation has been gradually promoted, providing a completer and more perfect legal environment for the development of E-commerce.

The province's innovation and entrepreneurial atmosphere are strong. Since 2016, Zhejiang Province has vigorously launched the province's E-commerce entrepreneurial innovation competition and selected many outstanding E-commerce talents and E-commerce development projects.

Fujian Province also continued to promote rural E-commerce plans, promote rural consumption, establish the Fujian Electric Power Trademark Committee, promote the further standardization of E-commerce work, and launched a series of E-commerce training lectures and activities, and the talent training system was gradually improved. Fujian Province has also set up corresponding demonstration parks and key development bases. Through professional operation management of these demonstration sites, the E-commerce service system has been gradually improved.

In 2016, Guangdong Province issued a series of policy documents on rural E-commerce and cross-border E-commerce, provided more professional and comprehensive development ideas and development direction for E-commerce development, and created a better policy environment. In addition, the model innovation of cross-border E-commerce and the promotion of rural consumption through rural E-commerce development are also important reasons for promoting the rapid development of E-commerce in Guangdong Province.

E-commerce in Hainan Province has also received government support, which provides a reliable policy guarantee for the rapid development of E-commerce. Similar to other provinces, the implementation of E-commerce into rural areas promoted the sales of agricultural products, led the development of the rural economy to support the rural poor, and also developed a series of logistics development documents, which made the E-commerce support system more perfect. At the same time, it also actively introduced E-commerce talents and launched E-commerce training activities, E-commerce investment activities, and the "E-commerce New Year Festival" to accelerate the construction of E-commerce industrial parks and promote the transformation and upgrading of traditional industries.

In this information age, people's lives are hardly separated from science and technology. As an inevitable outcome of the information age, E-commerce has brought great convenience to people's lives and work and has become an essential factor in the

country's economic development.

As an emerging business transaction model, E-commerce requires a developed economic foundation as a guarantee. Economic-developed region has excellent infrastructure construction on transportation, logistics and internet and so on, and it can attract foreign investment, high level of human capital and company with a competitive advantage, which provide E-commerce a suitable environment for development. An excellent economic foundation can promote the rapid development of E-commerce. In turn, the development of E-commerce has a robust driving effect on the regional economy.

A study have found that every 1% increase in China's E-commerce will drive GDP growth of 0.017%, and the driving force will be higher and more significant (Yang, 2011). From the development of E-commerce in the seven eastern economic regions selected in this paper, the great development of E-commerce is related to the excellent policy environment and government support, while it is also inseparable from the support of basic service systems such as broad radiation, an efficient logistics system, and convenient and safe payment methods.

At present, China's E-commerce is gradually entering a stage of steady growth. The regions with developed E-commerce have innovative development and business models and Focus on common development in many aspects. The implementation of the "E-commerce into the countryside" program has promoted the sales of agricultural products and raised the income level of farmers. E-commerce has become an essential carrier for rural poverty alleviation and entrepreneurship.

China's cross-border E-commerce has gradually developed and expanded to the world stage, welcoming the attention of various countries around the world, and its influence in the cross-border E-commerce field has been increasingly strengthened. At the same time, attaching importance to the cultivation of E-commerce talents has also promoted the development of E-commerce, such as establishing various forms of E-commerce research and training bases, and organizing training and seminars on E-commerce topics.

Chapter 7 Conclusion

In conclusion, the study confirms the hypothesis E-commerce plays a positive and important role in the economic growth at either sectoral level or macroeconomic level.

Based on the results the research obtains, E-commerce has a great influence in the trading sector, and it is becoming one of the most important factors to encourage the productivity of trading sector similar to current position and role of E-commerce in China. E-commerce has also gradually become one of the main driving forces for economic growth, and it brings more job opportunities and encourages employment either directly or indirectly, and eventually stimulates consumption to promote economic growth. From the results of the model that introduced the interaction term we can draw conclusions that there is no effect of E-commerce to make input productivity change in regions but E-commerce can make different effect of labour productivity in trade sector that there is a positive and significant effect of labour input on output of trade sector due to E-commerce.

E-commerce's introduction is conducive to transforming the unfavourable factors that drive economic growth of China. While reducing the fixed capital, it has improved work efficiency and utilized human resources effectively. Finally, with E-commerce's gradual promotion, the social employment rate has been dramatically improved (Huang, 2010). The more developed the regional economy, the higher the E-commerce development's level. As we can see from the current situation, E-commerce's development has been accelerated with the rapid development of information technology in line with this paper's result.

In areas with E-commerce development's low levels, most conventional companies have not reacted to E-commerce's rise actively and have a small-scale size of E-commerce and weak promotion abilities. Thus, in order to further promote E-commerce's growth and continue to play a significant role in encouraging economic growth, according to results we get and this paper indicates the government can strengthen the attention on E-commerce and E-commerce infrastructure's construction to maximize its economic contribution.

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CHULALONGKORN UNIVERSITY

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VITA

NAME Jinyi Li

DATE OF BIRTH 04 April 1995

PLACE OF BIRTH Yuxi City, Yunnan Province, China

**INSTITUTIONS
ATTENDED** Southwest Minzu University, China

HOME ADDRESS Supalai Park Ratchapruek, Phetkasem Road, Bangwa
Sub District, Pasricharoen District, Bangkok Thailand
10160



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY