URBAN SERVICES GROWTH:
INFLUENCING FACTORS AND ITS EFFECT ON REGIONAL GROWTH IN CHINA

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By

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ABSTRACT

Urban economic success depends on the growth of its services and there are various factors influencing urban services growth. However, earlier studies mostly focus on the demand and supply factors. Factors, such as the institutional environment and services spatial agglomeration, although are important in the context of urban services growth in China, are practically less emphasized. Thus, this study analyzed the contributions of demand, supply, institutional environment, and services spatial agglomeration as factors significance for urban services growth, using the hierarchical multiple regression. The Panel Unit Root Test, Panel Co-integration Model and Panel Vector Error Correction Model were used to examine the short-run and long-run effects of urban services growth on regional economic growth in China. The findings of the present study show that the demand, supply and services spatial agglomeration contributed significantly to urban services growth. However, the institutional environment had relatively smaller contributions, compared to other factors. The Error Correction Model indicated a short-run relationship, while the Panel Co-integration Model revealed the existence of a long-run relationship between urban services growth and regional economic growth in China. In conclusion, the government should implement strategies towards a more balanced urban services growth with specific priority on strategies to expand the demand and supply for urban services, improving residents' income, to promote urbanization, and deepen division of labor as well as to increase the quality and quantity of factor inputs in urban services. Indeed, future strategies should focus more on measures to promote urban services agglomeration, while improving the urban services marketization and their openness level.

Keywords: demand, supply, institutional environment, services agglomeration, regional growth

ABSTRAK

Kejayaan ekonomi sesebuah bandar bergantung kepada kemajuan perkidmatan yang dibekalkan. Walaupun terdapat pelbagai faktor yang mempengaruhi pertumbuhan perkidmatan di kawasan bandar, kebanyakan kajian awal lebih bertumpu kepada faktor permintaan dan penawaran. Sebaliknya, faktor persekitaran institusi dan perkelompokan reruang yang juga penting dalam konteks pertumbuhan perkidmatan di kawasan bandar masih kurang diberikan perhatian, khususnya di negara China. Justeru, kajian ini cuba menganalisis sumbangan faktor-faktor permintaan, penawaran, persekitaran institusi dan perkelompokan reruang sebagai faktor yang mempengaruhi pertumbuhan perkidmatan di kawasan bandar dengan menggunakan kaedah *Regresi Berbilang Berhirarki*. Sebaliknya, kaedah *Ujian Akar Unit Panel, Model Panel Bersepadu* dan *Model Panel Pembetulan Ralat Vektor* digunakan untuk menilai kesan jangka pendek dan jangka panjang di antara pertumbuhan perkidmatan di kawasan bandar dengan pertumbuhan ekonomi wilayah di China. Hasil kajian menunjukkan bahawa faktor-faktor permintaan, penawaran dan perkelompokan reruang mempunyai sumbangan signifikan terhadap peningkatan perkhidmatan di kawasan bandar, sedangkan sumbangan faktor persekitaran institusi tidak signifikan. Dapatan *Model Panel Pembetulan Ralat Vektor* pula menunjukkan hubungan jangka pendek, sementara ujian *Model Panel Bersepadu* membuktikan wujudnya hubungan jangka-panjang di antara pertumbuhan perkidmatan di kawasan bandar dengan pertumbuhan ekonomi wilayah di China. Sebagai kesimpulan, kerajaan wajar melaksanakan strategi pertumbuhan perkidmatan seimbang, dengan tumpuan khusus kepada strategi untuk menambah-baik faktor-faktor permintaan dan penawaran perkidmatan di bandar, meningkatkan pendapatan penduduk, memperkasa agihan tenaga buruh serta meningkatkan kualiti input faktor-faktor perkidmatan berkaitan. Justeru, strategi masa depan perlu difokuskan kepada usaha-usaha untuk menggalakkan perkelompokan perkidmatan di kawasan bandar, di samping menambah-baik tahap keterbukaan serta pemasarannya.

Kata kunci: permintaan, penawaran, persekitaran institusi, perkelompokan reruang, pertumbuhan wilayah

ACKNOWLEDGEMENT

The journey to complete this doctoral thesis was filled with obstacles and challenges, and at times forced me to evaluate the cost and benefit of completing it. Intense works, travelling needs, the responsibility to raise a family, a suddenly lost of my beloved dad (22/06/2011) , were among the obstacles that often marred my pace. Finally, the passion for learning and the desire to complete the long journey prevailed.

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To my Mum and late Dad, I thank them for the understanding and support rendered to me for these years of study, thanks for their cares to my son in the absence of my family responsibilities. My thanks to caring husband who always support and encourages me! Thanks to my son, the best gift of my life—it is him that gave me courage to face challenges!

Thank you and God Bless!

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ABBREVIATIONS

ADF	Augmented Dickey Fuller
ANOVA	Analysis of Variance
CEI	Commercial Credit Environment Index
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
VIF	Variance Inflation Factor
WTO	World Trade Organization

CHAPTER ONE

INTRODUCTION

Services are economic activities not directly associated with the production of tangible products, but activities providing intangible products with the characteristics of simultaneity in both production and consumption (OECD, 2000). Since 1970s, the proportion of services in developed countries has been continuously increasing, and the world's economy has turned towards "servitization", marking the coming stage of services economy (Hu, 2011; Liu et al., 2011).

China has made remarkable economic achievements since reform and opening up in 1978, and her economic structure has been gradually upgraded towards non-agricultural industries. As the republic entered the post-industrialization period since late 1990s, one important phenomenon was the increasing role of services in economic growth (Chen, 2011). For instance, the output value of services increased from RMB581.4 billion in 1990 to RMB13, 888.6 billion in 2011. Services average annual growth rate was 11.0 percent, exceeding the GDP growth of 9.9 percent during the same period of 1990-2011. Meanwhile, the corresponding proportion of services to national GDP increased from 31.3 percent in 1990 to 43.3 percent in 2011 ($China_1$, 2012).

One obvious characteristic of services growth is its high agglomeration, and urban

areas are becoming main spatial carrier for services growth in China (Li, 2006; Hu, 2008; Jiang, 2008; Chen et al., 2011). The output value of urban services created by cities accounted for 68 percent in national services output value in 2011, with employment share of 15 percent in national total services employment, and 51 percent in urban total employment. The services intensity (the ratio of services output value to urban area), an index for services spatial agglomeration, reached RMB21.56 million/sq.km, which is 10 times higher than national services intensity of RMB2.13 million/sq.km (China$_1$, 2012), indicating a higher degree of urban services agglomeration (Hu, 2011).

The Chinese government emphasizes strategies to accelerate the upgrade of urban industrial structural towards services in "The Eleventh National Economic and Social Development Five-Year Plan (2006-2010)" (State Council of China, 2006). During the Eleventh National Congress in 2011, the government stressed again to accelerate the interactive development of urban services and urban economy in "The Twelfth National Economic and Social Development Five-Year Plan (2011-2015)" as a strategic position for urban services in national economy (State Council of China, 2011).

However, despite the important strategic position of urban services in China, problems of apparent regional disparities have become major resistance for its growth. Urban services are well-developed in the Eastern regions, with the

proportion of urban services output value to Eastern GDP of 62.0 percent in 2011, followed by Central region of 48.0 percent, while the underdeveloped Western regions falled behind with only 39.0 percent. In fact, the respective shares of regional GDP to national GDP revealed similar patterns, with 61 percent for Eastern region, 20 percent for Central region, and 19 percent for Western region respectively ($China_1$, 2012). Therefore, the expanding regional gap in urban services does not only affect its own sustainable development, but also further enlarges the imbalance in regional economies (Hu, 2011).

Since urban services in China have become an important driving force for both urban and national economies, it is important to determine the factors influencing urban services and its role in regional economic growth, so to assist policy makers in designing more effective measure towards a balance and sustainable growth of urban services as well as regional economies.

1.1 Problem Statement

Urban services growth is the natural process that plays an important role for urban and regional economies. Since urban area are places with developed economic growth, higher population density, better accessibility of infrastructures, abundant information and human resources, large number of economic organizations and complex economic relations, it provides a favorable environment for the development of services. Therefore, urban area are the natural spatial carrier for

services (Hu, 2008; Guan, 2011; Chen et al., 2011).

There are numerous studies examining influencing factors of services, but these studies mostly focus either on the demand or the supply perspectives. For instances, Kuznets (1986), Chenery (1989), Appelbaum et al. (2002), Messina (2004), Andersson (2004), and Eisingerich et al. (2007) focus mainly on the demand sides. On the other hand, Baumol (1967), Browning and Singleman (1978), and Goodman et al. (2002) focus on supply factors, while only few authors emphasize on institutional environment (Benassy, 2005; Gwartnet, 2006), and agglomeration (Fujita et al., 2004; Geppert, 2008; Brulhar et al., 2009). In fact, these studies analyze the effect of influencing factors separately, instead of integrating all demand, supply, institutional environment, and services agglomeration together. In addition, these studies focus more on developed countries from the macro national level, compared to the urban level.

Similarly, for China, most of the studies focus either on demand (Ni, 2004; Cheng, 2005; Hu, 2008; Huang, 2008; Xie, 2009; Zeng, 2008; Chang, 2009; Cheng et al., 2010; Hu, 2009; Fan et al., 2011) or supply factors (Hu, 2008; Li, 2008; Wei, 2010; Zeng, 2008; Yang & Su, 2009; Zhang et al., 2011). These studies analyzed the effect of influencing factors separately, instead of integrating them together. Thus far, no studies have included factors of institutional environment and services agglomeration for a comprehensive analysis.

Furthermore, services played a critical role in regional economies, while, especially during its post-industralization period, the unbalanced regional growth in services would further enlarge the disparities in regional economies. While, several studies have been conducted on the effect of services on regional growth (e.g., Fan & Zhou, 2002; Jiang & Li, 2004; Li, 2005; Yu, 2008; Zeng, 2008; Wei & Cao, 2008; Wang, 2009; Hu, 2011; Yao, 2011; Wang et al., 2012), yet they are confined to macro -national perspective, without particular focus on urban services and regional growth.

In view of the above discussion, this study posits that, besides demand and supply factors, the institutional environment and services agglomeration factors also have great influences on urban services growth. As urban services and regional growth are interrelated, differences in urban services growth would further lead to the imbalance in regional economic growth. Accordingly, the enlarged imbalance in regional economies would in return further enlarge the gaps of urban services among cities. Thus, it is important to understand how these factors affect the growth of urban services in China, which would help to design effective measures towards a balance growth of urban services as well as regional growth.

1.2 Research Question

This study aims to determine the influencing factors of urban services growth using the comprehensive perspectives of demand, supply, institutional environment, and services spatial agglomeration as well as to investigate the effect of these factors on

regional growth in China. The specific research questions are to determine:

1. What are the effects of demand factors on urban services growth?
2. What are the effects of supply factors on urban services growth?
3. What are the effects of institutional factors on urban services growth?
4. What is the effect of services agglomeration on urban services growth?
5. What is the contribution of urban services towards regional growth?

1.3 Research Objective

The general objectives of this study are to analyze the influencing factors affecting urban services growth, and to investigate the relationship between urban services and regional economic growth in China. The specific objectives are:

1. To determine the effects of demand factors on urban services growth.
2. To determine the effects of supply factors on urban services growth.
3. To identify the effects of institutional factors on urban services growth.
4. To identify the effect of services' spatial agglomeration on urban services growth.
5. To measure the contribution of urban services growth on regional economic growth.

1.4 Significance of Research

This study contributes in the following three aspects:

First, this study extends previous studies by using a comprehensive analysis through incorporating supply factor of services productivity, institutional environment factors of service marketization and openness level, and services agglomeration in

determining their effects on urban services growth.

Second, most previous studies focus on standard regression estimation techniques to estimate the effects of influencing factors on urban services growth in China which evaluate the effecs of all the independent variables on dependent variable at one time (Li, 1994; Jiang, 2004; Hu, 2008; Wei et al., 2010). Whereas, this study uses hierarchical multiple regression estimation with panel data, in order to examine the respective contributions of the four main influencing factors on urban services growth, steps by steps.

Third, this study provides guidance for the policy makers and related regional agencies on the coordinated and sustainable development of urban services and regional growth, especially in China.

1.5 Scope and Limitation of the Study

The study focuses on factors influencing urban services growth in China, and the scope is urban services of 286 (out of the total 657) Chinese cities from 30 provinces and autonomous regions of Mainland China (excluding Autonomous Tibet). These cities were selected, since they contributed nearly 70 percent of national total services and become the main driving engines for both urban and national services growth in China. (Hu, 2008. refer Appendix A for details of city names). However, this study excludes the cities at county and town levels due to insufficient data.

Meanwhile, another limitation encountered is that only the overall urban services industry is involved, since the specific urban service sectors (such as finance, insurance, real estate, information and technology, business, transportation, education, healthcare and others) are excluded from the study due to data unavailability.

Accordingly, the 30 provinces and autonomous regions are further grouped into three main economic regions in order to examine how urban servies affect the regional economic growth in China. (Figure 1.0):

: Eastern Region
: Central Region
: Western Region

Figure 1.0

Map of China

Source: State Bureau of Surveying and Mapping of China 2012

1. The Eastern region:

   i) 3 municipalities of Beijing, Tianjin, Shanghai (directly administrated under the Central Government)

   ii) 8 provinces of Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan;

2. The Central region:

   i) 8 provinces of Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan

   ii) 1 autonomous region of Inner Mongolia;

3. The Western region:

   i) 1 municipality of Chongqing,

   ii) 6 provinces of Sichuan, Guizhou, Yunnan, Shanxi, Gansu, Qinghai,

   iii) 3 Autonomous regions of Guangxi, Ningxia, and Xinjiang.

1.6 Organization of the Study

The thesis consists of six chapters. Chapter one provides an introduction including the problem statement, research questions and objectives, research significance, and limitations of the study. Chapter two presents literature reviews involing the concept of services, the background of urban services growth in China, the influencing factors of services growth, and the effect of services on economic growth. Chapter three describes the theoretical framework and hypothesis development. Chapter four elaborates on research methodology, the measurement of variables and the models involved. Chapter five disscusses the empirical analysis and provides the results. Finally, Chapter six provides the conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

The rapid development of services in world economy since 1970s has attracted much academic attention. Various researches on the definitions and characteristics of services (Hill, 1977; Singleman, 1978; Miles, 1983; Illeris, 2007), the classification of services (Katouzia, 1970; Singleman, 1975), and the relationship between services and economic growth (Illeris, 1989; Siegel, 1999; Guerrierini, 2005; Goldsmith et al., 2007) have been conducted. Meanwhile, related studies concerning influencing factors of services growth have been analyzed from many perspectives. This chapter provides reviews on the concept and classification of services, the background of urban services growth in China, the influencing factors of services growth, and the relationship between services and economic growth.

2.1 Concept and Classification of Services

It is difficult to determine a clear and uniform definition of services due to its nature of heterogeneity, complexity, and multidimensionality (Stigler, 1956; Gershuny and Miles, 1983; Li, 2004; Cheng et al., 2004). However, there are numerous attempts to describe services, and there is an overall recognition of what they are and how they contribute to the economy (Gabbott & Hogg, 1994; Phalke et al., 2010). Initial discussion of services could be traced back to classical economists (Smith, 1776; Say, 1803; Marshall et al., 1895). Smith (1776, cited in Huang, 2004) uses The Value of

Labour Theory to divide labour into productive labour-providing material products and nonproductive labour-providing services. He further views services as a kind of special intangible and unproductive product that is not able to create wealth.

Hill (1977) rejects the classical view that services play no role or only a parasitic role in economic growth. He supports that services are not a product but a production activity through which they could change the situation of their consumers. However, his argument is only applicable to traditional services such as hair cut service and entertainments. The argument is not able to explain services such as finance and management.

Gruble and Singelmann (1978) and Miles et al. (1983) view services as activities providing intangible products with the characteristics of simultaneity in both production and consumption. OECD (2000) defines services as a diverse group of economic activities not directly associated with the manufacturing of goods, mining, or agriculture products. Services cannot be inventoried and must be consumed at the point of productions. Hill (1999) and Illeris et al. (2007) summarize the characteristics of services as intangible and invisible inventory, perishable and simultaneous in production and consumption, and knowledge- and capital-intensive, and have a high income elasticity.

Besides the basic characteristics such as intangibility, invisibility, and simultaneity in

both production and consumption of services, Chinese researchers namely Li (2004), Jiang (2004), Cheng (2005), Tan (2007), Jiang (2008), and Wang et al. (2009) further point out that services especially producer services have obvious characteristics of high industrial dependency (especially on secondary industry), high intensive inputs of human capital and technology, high spatial agglomeration, and high value-added.

Since 1930s, literatures have begun to pay more attention on services classification (Katouzi, 1970; Singleman, 1975; Gershuny and Miles, 1983; Illeris et al., 2007). For example, Katouzi (1970) uses services functions to classify services into three types:

1. auxiliary services for manufacturing industry, such as finance, transportation, and commerce;
2. new emerging services for final consumption, such as education, health care, and entertainments; and
3. traditional labour-intensive services such as haircut and house serving.

From the input-output perspective, Browning & Singleman (1975) classify services into four sectors related to their economic functions, namely producer services, distributive services, private services, and social services. This classification is widely known as the Services Quartering Classification Method. Table 2.1 provides the details.

Table 2.1

Services Quartering Classification Method

Sector	**Producer Services**	**Distribution Services**	**Private Services**	**Social Services**
Definition	Sectors providing intermediate services mainly for manufacturing enterprises.	Sectors providing moving services and products for production and final consumption	Sectors providing final consumer services for private family.	Sectors providing unproductive and nonprofit public services for final consumptions.
Main Sectors	Finance, Insurance, Real estate, R&D, Accounting, Laws, Business	Retail, Wholesale, Transportation, Communication	Hotel, Catering, Entertainments, Haircut, Maintenance, Housing services.	Healthcare, Education, Social Welfare Infrastructures Social Guarantee

Source: Browning, H., & Singelmann, J. (1975).

As for China, there was no independent classification on services before 1985. During that time, the Material Products Balance Sheet Accounting System (MPS) was adopted for the calculation of national economy. Under MPS, the calculation of national GDP was only limited to the net output value of primary and secondary industries, while the services were not included into calculation.

The 1st National Economy and Industrial Classification Standard was adopted in 1985, and this system began to operate independently. However, an obvious drawback in this classification was that it failed to clearly differentiate consumer services from producer services. Since 1990s, the National Development and Reform Commission of China had made several amendments due to the rapid growth of services in China. The Commission introduced the latest National Economy and Industrial Classification Standard in 2011. Thus, services in China can be divided into four main categories namely producer services, distributive services, consumer

services, and social services, including 14 subcategories and 48 tertiary categories. Table 2.2 provides details on the present classifications:

Table 2.2
Classification of Services in China

First Level Classification*	**Second Level Classification**
Producer Services	Finance & Insurance Services
	Real Estate Services
	Information Transmission, Computer & Software Services
	Scientific Research & Technical Services
	Leasing & Business Services
Distribution Services	Transportation, Storage & Postal services
	Wholesale & Retail Services
Consumer Services	Hotel Accommodation & Catering Services
	Resident Services & Other Personal Services
Social Public Services	Education
	Health, Social Security & Social Welfare
	Culture, Sports & Entertainments
	Public Administration
	Social Organizations
	International Organizations

Note: *****based on four levels of Services Quartering Classification by Singleman (1975).
Source: National Development and Reform Commission of China, 2011.

2.2 Urban Areas and Urban Services in China

Services growth is the essence of industrial upgrading process in urban economy. In this process, urban areas play the role of a spatial carrier for services growth (Yu, 2010). This section introduces the urban areas and the process of urban industrial changes to understand urban services growth in China.

2.2.1 Urban Areas

The domestic economic reform in China began in 1978 starting in rural areas. Since early 1984, the focus of economic reform had moved from rural areas to urban areas. Urban areas had experienced rapid growth with the number and scale of cities expanded continuously, especially under the strategies of China's industrialization, modernization, and urbanization.

Generally, the present urban administrative system for China is officialy divided into four levels, based on the proportion of non-agriculture population, population not pursuing agriculture activities, and have official certification as city resident. The four city levels are: (1) the municipalities which are directly under the administration of Central Government; (2) the prefecture cities (including autonomous prefecture cities) which are under the administration of provinces (or autonomous provinces); (3) counties which are under the administration of prefecture cities; (4) towns which are under the administration of counties. Accordingly, the municipalities and prefecture cities are known as the cities at the prefecture-level and above (see Figure 2.1).

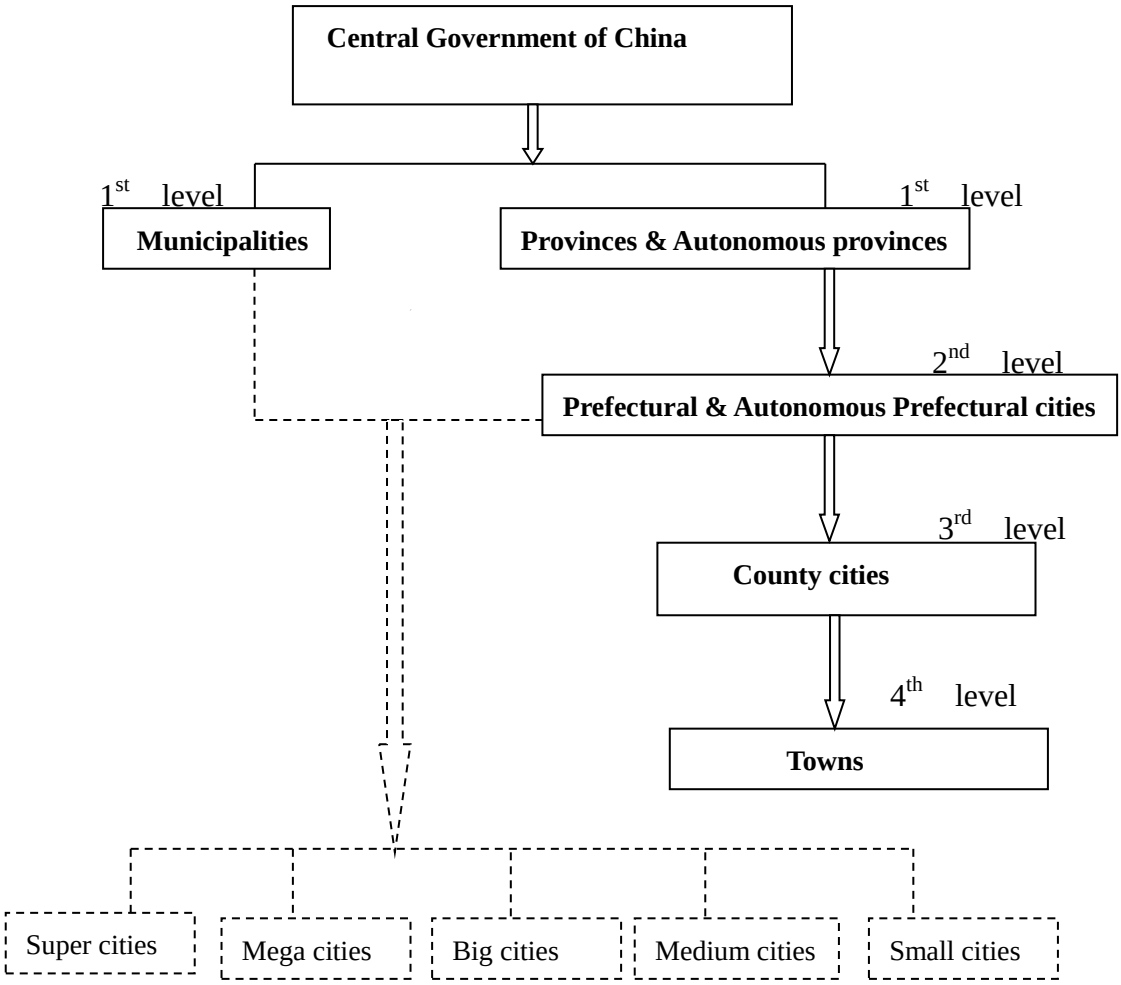


Figure 2.1
China: The Structure of Cities
Source: Desined based on China Statistical Yearbook 2011.

The cities at prefectural level and above are further divided into five sizes based on the nonagricultural population in urban areas (Figure 2.1 and Table 2.3)

Table 2.3

China: Types of Prefecture Level and Above Cities

Type of city	**Nonagricultural Population (million）**	**Number of cities**				
		1990	**1995**	**2001**	**2005**	**2010**
Super city	>4	3	3	8	13	14
Mega city	2-4	6	7	16	25	30
Big city	1-2	21	22	69	75	81
Medium city	0.5-1	28	43	105	108	109
Small city	<0.5	128	135	71	65	52
Total		**186**	**210**	**269**	**286**	**286**

Source: China Statistical Yearbook 1991-2011.

From 1990 to 2010, the total number of cities at prefecture level and above increased 50 percent from 186 to 286 (China$_3$, 1991-2011). Meanwhile, due to rapid urbanization, the size of prefecture cities enlarged. Specifically, the number of medium cities experienced the highest growth with an increase of 81 cities, followed by big cities with an increase of 60, mega cities with an increase of 24, and super cities with an increase of 11. However, the number of small cities reduced by 76, indicating the expansion of total prefectural cities in China. Figure 2.2 and Appendix B further present the regional distribution of these cities.

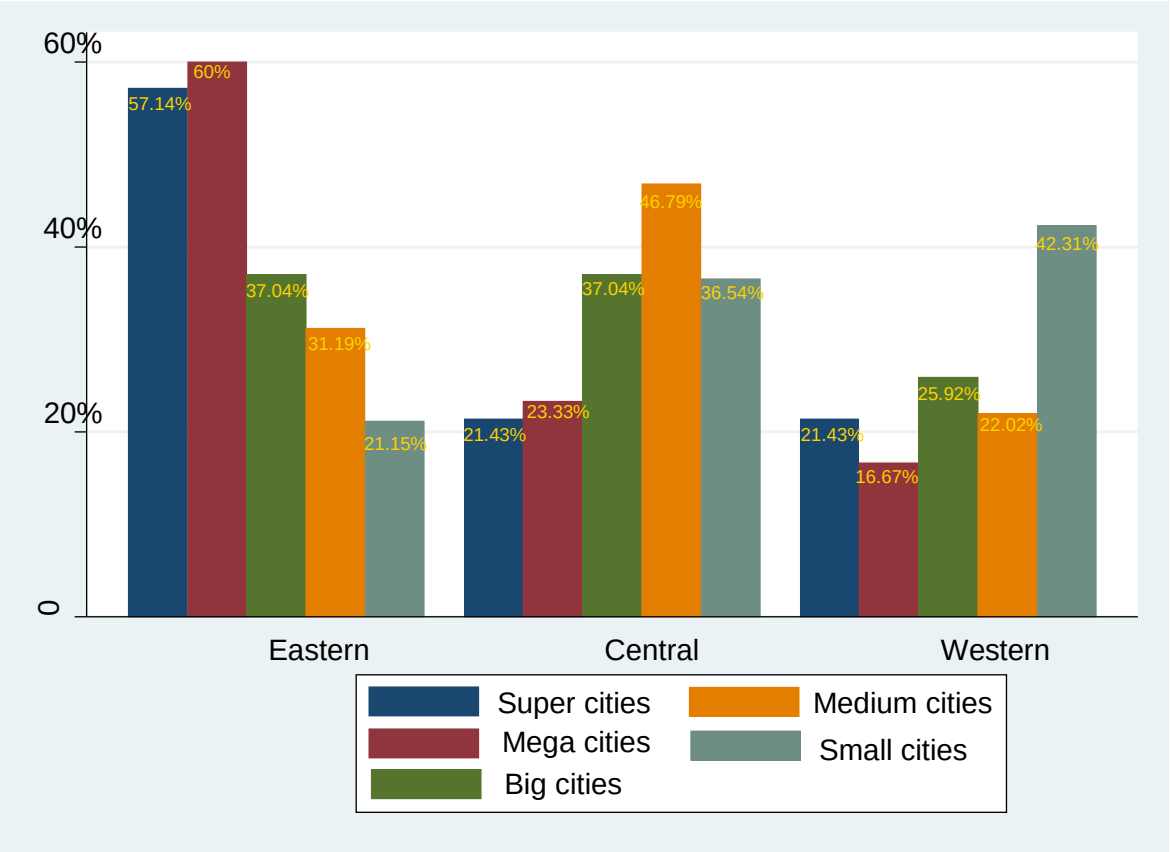


Figure 2.2
Distribution of City Types (2010)
Source: Appendix B

Obviously, there is an imbalance in the regional distribution of these cities. Most of super cities (57.14 percent) and mega cities (60 percent) are located in Eastern region, followed by Central region (21.43 percent and 23.33 percent) and Western region (21.43 percent and 16.67 percent). Similarly, a same 37.04 percent of big cities are located in Eastern and Central regions respectively, with the remaining 25.92 percent in Western region. The majority of medium cities (46.79 percent) are located in Central region, followed by 31.19 percent in Eastern and 22.02 percent in Western region. However, Western region has the highest percentage of small cities (42.31 percent), followed by 36.54 percent in Central region, and 21.15 percent in Eastern

region. The results reveal the fact that larger (super, mega) scale cities are highly concentrated in economic developed Eastern region; big and medium cities tend to be concentrated in Central region; and small cities are highly distributed in less developed Western region.

Meanwhile, with the increasing number and expanding scale of prefecture level and above cities, their economy also experienced rapid growth. The share of urban GDP of prefecture cities to national total increased from 37.0 percent in 1990 to 62.0 percent in 2010, indicating prefecture cities and above were becoming the main driving force and engines for both urban and national economy in China (Hu, 2011).

The rapid growth of urban economy in China has been accompanied by the great structural changes in urban. Figure 2.3 and Appendix C1 presented the changes in the proportion of urban sectoral output value to urban GDP from 1990 to 2010.

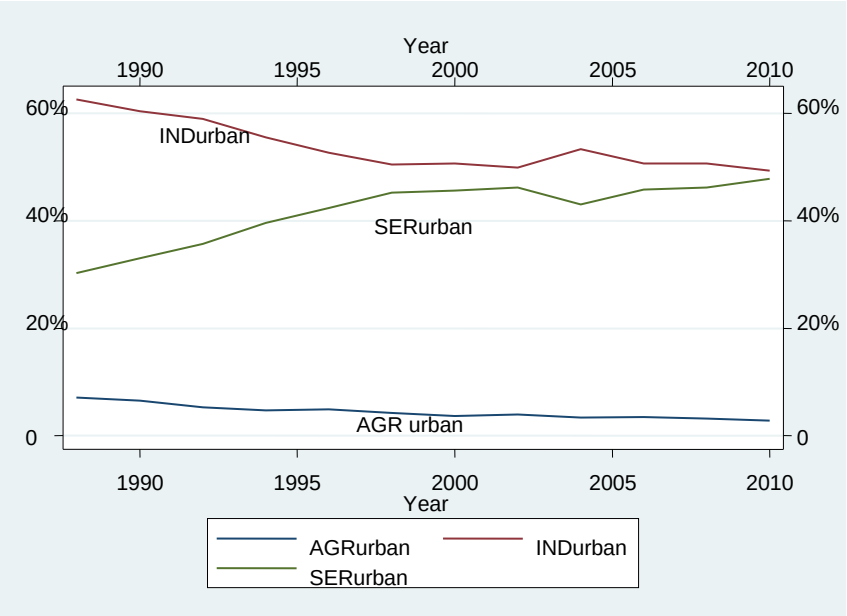


Figure 2.3
The proportion of Urban Sectoral Output Value to Urban GDP
Source: Appendix C1

Figure 2.3 shows that the proportion of urban agriculture industry to urban GDP (AGRurban) kept decreasing from 6.5 percent to 2.8 percent from 1990 to 2010. The proportion of urban secondary industry to urban GDP (INDurban) decreased from 60.4 percent to 49.9 percent (1990-2002), but experienced a small increase from 51.9 percent to 53.4 percent (2003-2004), propelled by tax reductions in manufacturing industries to overcome a sudden outbreak of Serve Acute Respiratory Syndrome (SARS) epidemic. However, its proportion declined further after 2005. Despite the decreasing share of secondary industry in overall economies, it remained the highest contributors towards urban economy, implying it still the critical driving industry for urban growth in the post-industrialization period of China (Liu, 2011).

Interestingly, the proportion of urban services to urban GDP gradually increased

from 33 percent to 47.8 percent (1990-2010), indicating the strength of urban services contribution towards urban economic growth.

2.2.2 Urban Services

The evolution of urban services growth in China can be divided into two distinct periods:

1) Reform Periods: 1978-1992

During economic reform and opening up from 1978 to 1992, China's economy was dominated by the high proportion of public ownership economy, and services were recognized as an useful supplement of national economy. Various low skilled individual service businesses such as catering, hair dressing, and repairing began to develop in urban areas. Since 1988, with the deepening of opening up policy and the increase in private capital accumulation, the private services enterprises were permitted to develop independently in urban areas (Liu, 2006). Several policies that encouraged services investment (Beijing, 1988 and 1990) were introduced by the government to encourage funds from Taiwan, Hong Kong, and Macau to invest in the services. Since then, the ownership structure in urban services had transformed from single public (or government) owned to multi-owned (including both public and private). However, urban services were still dominated by the traditional labour-intensive sectors, and were controlled by the government under the highly concentrated planned economy (Fan, 2006).

2) Marketization Reform: Beyond 1992

Urban services experienced rapid growth concurrent with industrialization since 1992, when the Chinese Economic Marketization Reform had been initiated. In 1992, the Central Committee and State Council of Chinese government introduced "The Decision on Accelerating Urban Services Development" (State Council of China, 1992) where the urban services were viewed as a strategic industry in urban and national economy. Since then, the government gradually relaxed the limitations on the business scope of private urban services. The private sectors and FDI were allowed to participate in services such as transportation, postal and telecommunication, and education services, which normally were under high government control.

Meanwhile, due to rapid industrialization, various negative externalities began to emerge, such as the crowd traffics, scarce land, increasing rent especially for manufacturing enterprises, and severe pollutions by manufacturing enterprises. Subsequently, the government introduced a policy known as "Retreat Secondary Industry and Promote Service Industry in Urban" (State Council of China, 1995). The main focus of this policy was to upgrade the urban structure towards services. Thus, the secondary industry especially the polluted manufacturing industries should be gradually retreated from cities and transferred to suburbs. Under this policy, urban services experienced rapid growth.

As China joined WTO in 2001, various services sectors such as finance, construction, distribution, law, telecommunications, tourism, and transportation had been opened up to internal market. This initiative further propelled the growth of urban services. At the same time, the government accelerated the marketization reform to reduce government involvement, and encouraged multiple market participants in urban services. Hence, more than 3,000 laws, administrative regulations, and departmental rules were developed and amended, which had attracted the inflows of FDI in urban services and gradually formed a multiple ownership structure, implying the improvement in marketization level in urban services (Zheng, 2008). The government further emphasized strategies to accelerate urban services in "The Eleventh National Economic and Social Development Five-Year Plan" (2006-2010), marking the strategic positions of urban services.

Generally, since 1990s, urban services growth in China has the following features.

i. The main spatial carrier for services growth

Figure 2.4 shows the comparison between the proportion of urban services in urban GDP and the proportion of national services in national GDP from 1990 to 2010.

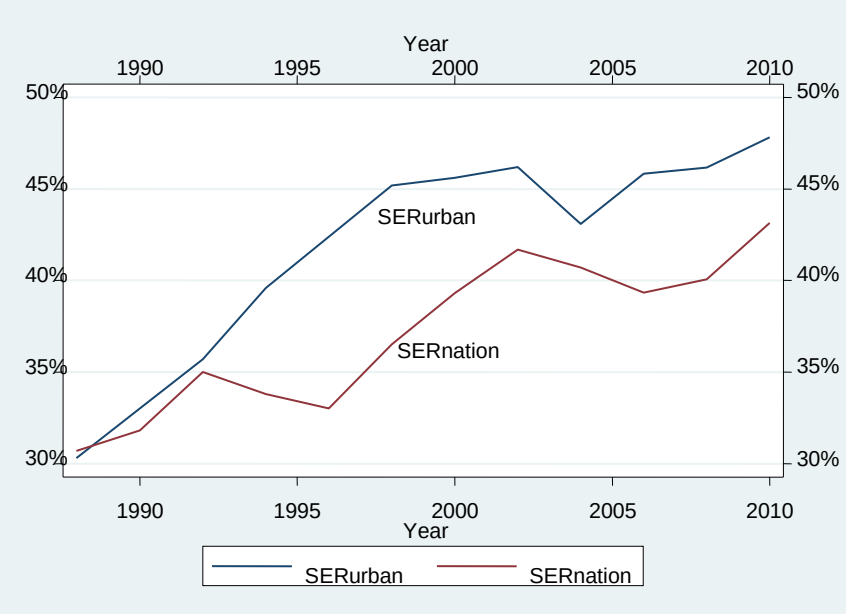


Figure 2.4
The Proportions of Urban and National Services to GDP
Source: Appendix C1

It is clear that the proportion of urban services in urban economy grew higher than that of national level during 1990 to 2010, and their gap widened during this period. During 1990 to 2005, the proportion of urban services output value to urban GDP increased from 33.0 percent to 46.4 percent, and the corresponding proportion of national services output value to national GDP increased from 31.8 percent to 39.9 percent. Accordingly, the gap between urban services and national services increased from 1.2 percent to 6.5 percent.

The proportion of urban services output value to urban GDP increased from 45.8 percent to 47.8 percent, while due to services growth in county cities, the proportion of national services increased from 39.4 percent to 43.1 percent during the Eleventh Five-Year Plan 2006-2010. However, despite the gap between urban services and

national services that declined from 6.4 percent to 4.7 percent, urban services were still by average higher than national services, implying urban services remained as the main components and driving force for national services growth.

Figure 2.5 shows the output value share of urban services in national output value from 1990 to 2010. This figure further reveals that status and contributions of urban services in national services growth.

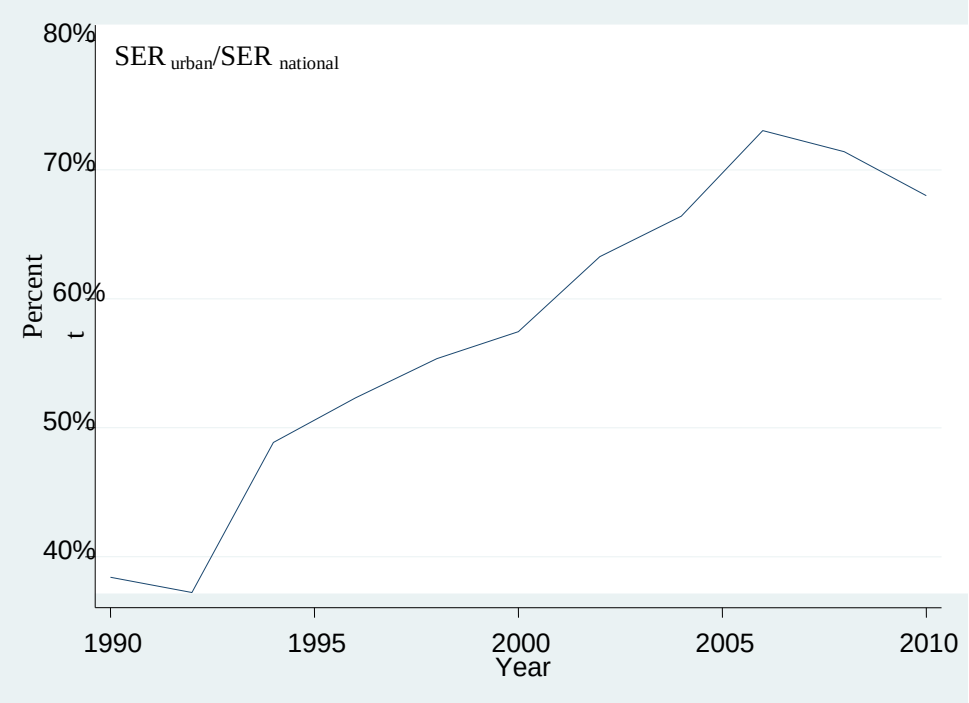


Figure 2.5
Share of Urban Services in National Services (%)
Source: calculated from Appendix C1

The proportion of urban services to national total services increased from 38.4 percent in 1990 to 68.0 percent in 2010. This ratio experienced a small decline after 2006 due to a rapid growth in national total services during "The Eleventh Five-Year

Plan" (Hu, 2011). However, it is still obvious that urban services contributed to the majority of national total services growth.

ii. Generating employment opportunities

Since 1990s, the structure of urban employment has experienced great changes. The employment in agriculture industry (AGR_L) decreased from 19.6 percent to 0.72 percent, while the employment for secondary industry (IND_L) decreased from 48.9 percent to 47.3 percent. Comparatively, the proportion of employment in urban services ($URBS_L$) increased from 31.5 percent to 51.97 percent between 1990 and 2010, respectively (see Figure 2.6).

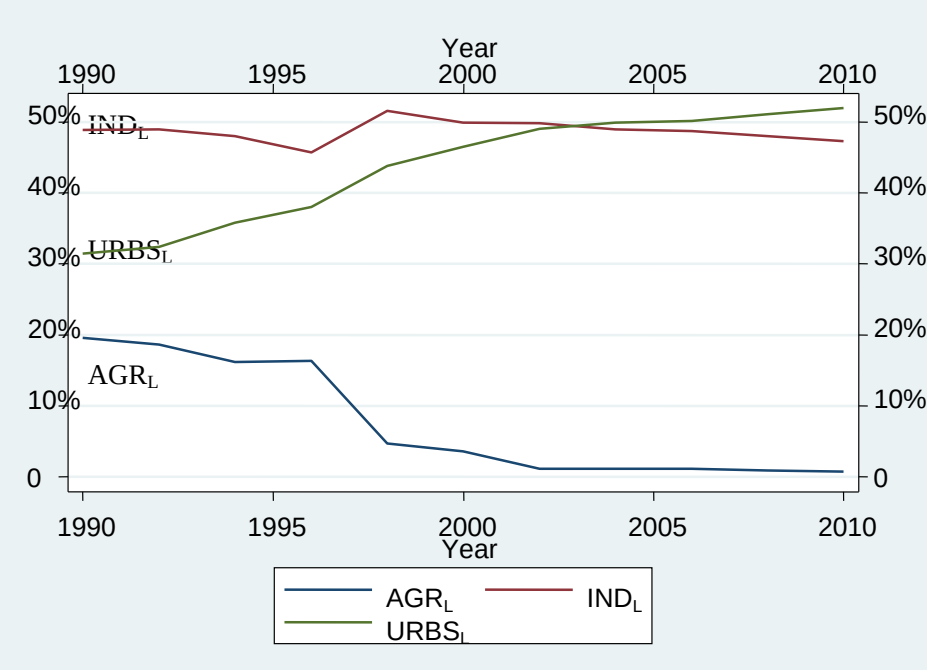


Figure 2.6
Structural Changes of Urban Employment: 1990-2010
Source: Appendix C2

Indeed, the proportion of urban services employment to total urban employment transcended 50 percent since 2006 (see Appendix C2), representing the sectors as the main channel for employment opportunities in urban, particularly during the Five-Year Plan from 2006 to 2010.

iii. Growth of domestic physical capital investment

Urban services growth in China is also driven by domestic physical capital investment. The capital investment in urban services could accelerate factor accumulation and increase productivity, thereby contributing to urban services growth (Jiang, 2008). Figure 2.7 shows the ratio of physical capital investment in urban services to urban total physical capital investment (SK), and the ratio of urban services output value to urban GDP (SER_{urban}). From 1990 to 2010, the general trend of urban services growth was in line with the physical capital investment, implying the significant positive role of physical capital investment for urban services growth.

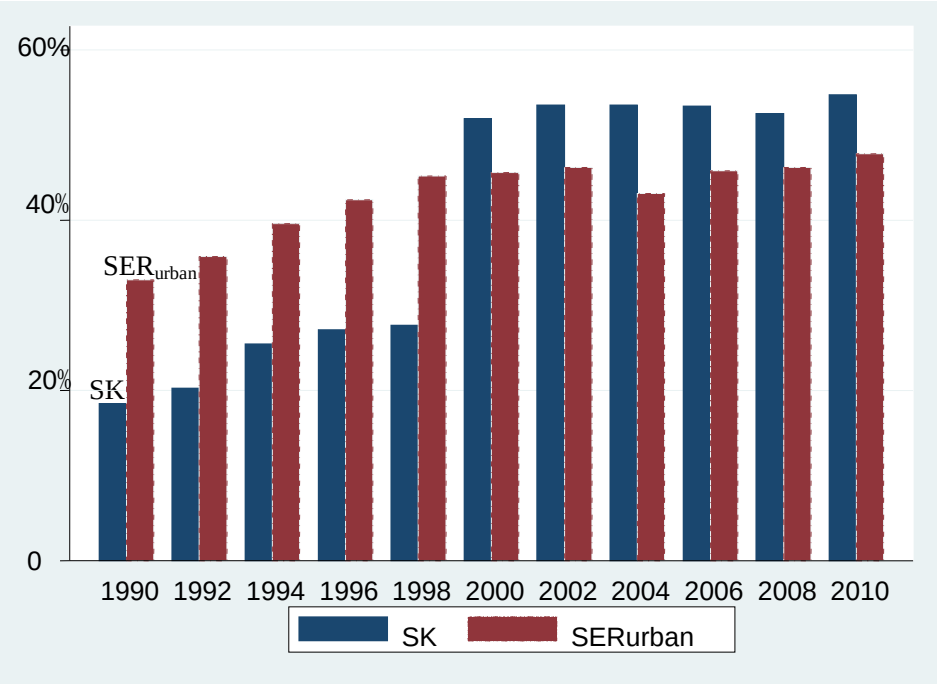


Figure 2.7
Proportion of Physical Capital Investment and Urban Services Growth
Source: Appendix C3

Specifically, the ratio of physical capital investment (SK) from 1990 to 2010 increased from 18.5 percent to 54.7 percent. It is notable that the proportion of physical capital investment in urban services overtook the proportion of urban services output value since 2000, indicating the capital-driven characteristics of urban services growth in China.

ⅳ. Improvement of services openness

Figure 2.8 represents the share of FDI in urban services to national FDI in services ($SFDI_{urban}/SFDI_{national}$) and the proportion of FDI in urban services to urban total FDI ($SFDI_{urban}/FDI_{urban}$) respectively from 1990 to 2010. The share of FDI in urban services to national FDI in services increased from 35.23 percent to 74.0 percent.

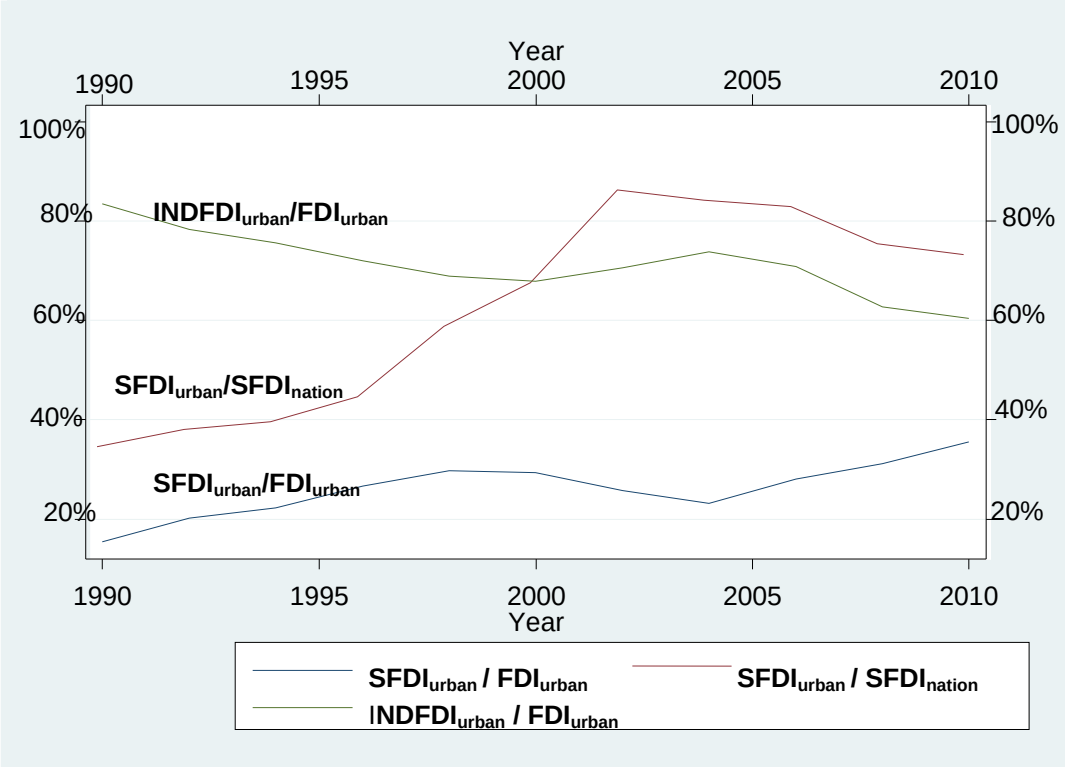


Figure 2.8
The proportion of FDI in urban services: 1990-2010
Source: Appendix C4

This share increased to more than 80 percent since China's entrance to WTO in 2001. Despite of its share that decreased to 74.0 percent (since 2008) due to global finical crisis, urban services still absorbed the majority 70 percent of national FDI.

Although the proportion of urban services' FDI to urban total FDI ($SFDI_{urban}$/ FDI_{urban}) increased from 15.4 percent to 35.6 percent, it still lagged behind that of the secondary industry ($INDFDI_{urban}/FDI_{urban}$), indicating at present, the urban secondary industry still dominates the FDI flows.

v . Regional imbalance in urban services growth

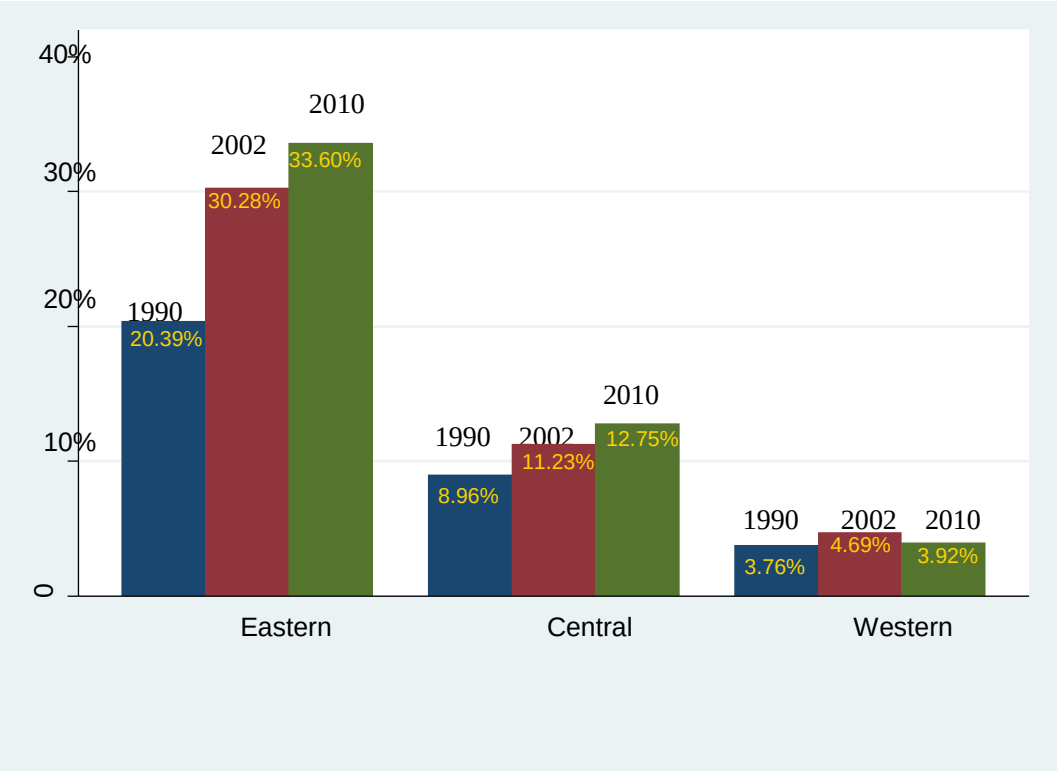


Figure 2.9
The proportion of regional urban services to total urban GDP
Source: Appendix C5

It is obvious that urban services in Eastern region were the most developed and much higher compared to Central and Western regions. The proportion of urban services in Eastern region to total urban GDP increased from 20.39 percent to 33.6 percent, the Central region increased from 8.96 percent to 12.75 percent, while the proportion for Western region fluctuated around 4 percent during 1990-2010 (see Figure 2.9).

The gap in the proportion of urban services to total urban GDP between Eastern and Western region was the most significant, with an increase of 13.05 percent during the period, followed by the gap between Eastern and Central regions with an increase of

9.42 percent, and the gap between Western and Central regions increased by 3.63 percent. Indeed, the gaps of urban services growth clearly indicated significant regional imbalance between those three regions.

2.3 Demand Factors of Services Growth

The argument concerning factors influencing services growth initially originated from the demand side. Demand factors in this study refer to the elements that could affect or determine people's need and consumption on service products. Earlier studies such as Fisher (1935), Petty and Clark (1940), Rostow (1961), Bell (1973), and Chenery et al.(1975) pointed out that the economic and industrial evolution was the transition from agricultural-dominated to industrial-dominated, and then to services economies. They highlight the final demand factors are the basis for services growth. Per capita income was firstly justified as an important demand factors on services growth. Classical economist, William Petty (1691) firstly noticed the special role of income level in the process of services growth. This attracted later studies on the relationship between per capita income level and services growth (Kuznets, 1986; Chenery and Syrquin, 1989; Appelbaum, 2002).

Other demand factors that receive great attention are urbanization and division of labour (Chenery, 1975; Singelmann, 1978; Henderson, 1997; Tiffen, 2003; Messina, 2004; Andersson, 2004; Eisingerich et al., 2007). Accordingly, high urbanization and division of labour could strengthen population and production concentration in urban,

thereby generating great demand for related services and promoting services growth.

Several related studies on relationship between demand factors and services growth in China are also around topics of per capita income (Li, 2004; Hu, 2008; Xie et al., 2009), urbanization (Gao, 2006; Zeng et al., 2008), and division of labour (Chen, 2009; Fan, et al. 2010). Therefore, the following section provides reviews on per capita income, urbanization and division of labour as demand factors affecting services growth in China.

2.3.1 Per Capita Income

The role of income as a determinant of services growth could be traced from the classical economist, William Petty (1691, cited in Cheng, 2004). He points out that as economy grows, the focus would be gradually shifted from agriculture industry to secondary industry, and then to business services. He further explains that the profits in secondary industry were much higher than the primary industry, while the profits in business services were higher than in secondary industry. These profits differences would induce labour to move from primary to secondary and then to business services sectors gradually, hence promoting business services growth.

Clark (1940) further discusses the changes in demand structure for final consumptions in these sectors. He concludes that for people with low income level, their needs are mainly to meet basic necessities for survival. Thus, the main demand

would be agricultural products. As their income improves, people would shift to manufacturing products, and then to services consumption. This finding confirms Petty's view, hence establishing the "Petty Clark Theorem", which reveals the positive relationship between income level and services growth.

Other literatures such as Fisher (1935 and 1939), Fourastie (1949), Rostow (1961), Bell (1974), and Chenery et al. (1975) also conclude that per capita income is the main factor influencing consumer services growth, as demand for services is of high income elasticity. Subsequently, the increased demand for consumer services induced by income improvement would contribute towards services growth.

Rostow (1961), in *The Stages of Economic Growth* justifies new synthesis on modern economic growth based on 5 main stages as follows: (1) the traditional agriculture society; (2) the preconditions for takeoff; (3) the takeoff; (4) the drive to maturity; and (5) the age of high mass consumption.

Rostow (1961) holds that the take off stage is characterized by a large proportion shift of agricultural labours in the preconditions stage towards transportation services, commercial and trade services, financial services, and other service sectors, that are critical for services growth. Furthermore, a political, social, and institutional framework emerges to exploit modern expansion, implying that banks and capital market services sectors begin to drive towards maturity stage. When the economy

enters the stage of high mass consumption (characterized by high social wealth and high personal income), it would generate greater demand for consumer services, thereby promoting rapid growth of consumer services.

Bell (1973) shows a similar view in his famous "Post-Industrial Society Theory". He suggests that, as an independent industry, services and its internal structural evolution are closely related to income growth. However, his thought is different from Rostow as it is not a simple linear relationship between services and the income growth level. He groups services growth into three stages as follows:

1) The first stage: Agriculture society with low labour productivity and social wealth, and a lot of surplus unskilled labour force. In this stage, only some personal and family services are developed.

2) The second stage: Industrial society with mass producing activities and high social wealth (or income level). Some producer services such as commercial, finance, and insurance services grow closely with manufacturing activities and therefore, producer services experience rapid growth.

3) The third stage: Post-industrial society with high improvement in social wealth and income level, higher proportion of demands would turn to services products, hence promoting services production and aggregated growth.

Kuznets (1966) through "The Modern Economic Growth Theory" summarizes that

the modern economic growth is a continuous growth of per capita income, rapid growth of population, and the evolution of industrial structures. He further relates industrial changes involving three aspects namely industrialization, urbanization, and demand structure changes. Accordingly, the modern economic growth is not only a revolution in secondary industry, but also revolution in services industries. During industrialization process, the status of services is more prominent. As income improves, the demand for entertainments services, public services, education, and health services would be greatly improved, thus promoting services growth.

Kuznets (1984) makes an in-depth empirical analysis on the relationship between per capita income and changes in the industrial output value based on 57 developed countries. He finds a positive relationship between per capital income and services output growth. Specifically, as per capita income grew, the output ratio of agriculture industry continuously declined, while the ratio of manufacturing industry would firstly increase during the early and middle industrialization stage, but tend to decline in the late industrialization (or post-industrialization) periods. Comparatively, the output ratio of services continues to increase. However, he fails to make a further test on the contribution of per capital income on services growth.

Chenery and Syrquin (1975) discuss the industrial changes of 100 developing countries from 1950 to 1970, using “Standard Industrial Model”. They conclude that, as per capita income increased from below USD100 to above USD1,000, the

corresponding proportion of services output to GDP increased from 0.3 to 0.386, and the proportion of services employment to total employment also improved from 0.210 to 0.473. Although the contributions were not large as compared to developed countries, it further verified a positive relationship between per capita income and services growth.

Li (1994) makes a cross-section regression analysis on the relationship between the proportion of industrial output and income levels based on 92 countries in 1982. He groups these countries into low-income, middle-income, high-income oil producing and marketing industrialization countries. He finds a common tendency that as per capita income increased, the proportion of primary industry continuously declined, while the proportion for secondary industry would increase to saturation point of 40-45 percent, and then decreased. However, the proportion for services growth indicated a continuous increasing trend. The proportions of both employment and output in services were positively correlated with per capita income. Similarly, Appelbaum and Schettkat et al. (1999) find a positive relationship between per capita income and the proportion of output in services in the developed countries.

Li (2004) conducted an empirical study for China, and found that the final demand for consumer service products had high income elasticity. Thus, per capita income became a significant factor affecting consumer services growth in China. Ni (2004) and Jiang et al. (2004) conducted a multiple regression analysis on influencing

factors of urban services growth, using cross-sectional data of 220 Chinese prefectural cities. They found that per capita income was the most significant determinant of urban services growth with elasticity coefficient of 0.09, followed by urbanization with coefficient of 0.07 and population density with coefficient of 0.05. Similarly, Hu (2008) and Xie et al. (2009) conclude that per capita income contributed positively towards final demand for urban consumer services.

In conclusion, it is clear that both the theoretical and empirical evidences support the significant roles of per capita income on services growth, hence a critical demand factor for urban services growth in China can be postulated.

2.3.2 Urbanization

There are various definitions of urbanization. For example, Bergsman et al. (1972), define urbanization as the transformation process of rural or agricultural population into urban or nonagricultural population. Lucas (1988) and Harris et al. (1995) state that the transfer of labour from decentralized and low-efficient agriculture industry into efficient manufacturing and service industries that were highly agglomerated in urban areas was the critical starting point of urbanization. Therefore, urbanization is by essence the process of nonagricultural transition (Fujita, 2004; Rosenthal et al., 2004).

Since 1970s, when developed countries entered the “post-industry” period, the

relationship between urbanization and services growth had received great attentions. Chenery (1975) firstly holds that urbanization is the basis and critical factor to promote services growth. He made an analysis using data on more than 100 countries during 1950-1970 and found that the process of urbanization was earlier than that of service growth. At the early stage of economic growth with per capital GDP of USD250, the urbanization rate had already reached the middle level of 43 percent, while only when per capital GDP reached USD450 did the proportion of services output in national GDP reached the middle level of 41 percent. The result justified his point that service products need a direct face-to-face transactions, and the facilities in urban areas provide a convenience for services production and transactions, therefore urbanization is the demand basis for services growth.

Several literatures discuss the effect of urbanization on services growth (Riddle, 1986; Mills, 1979; Daniels, 1994; Harris, 1995; Fujita et al. 1999; Rahman, 2000; Henderson, et al. 2004). According to these studies, there are two factors how urbanization fosters services:

i) To increase final demand for consumer and public services through high population concentration in urban areas, such as retail services, hotel and catering services, entertainments, education, and healthcare. For example, Kuznets (1966), Mills (1979), Riddle (1986), and Daniels et al. (1994) point out that in the process of urbanization, the shift of population from rural to urban areas increases the market demand for agricultural products in urban, thus more agricultural products are

needed to meet the high demand for urban consumption, hence promoting the development of related transportation services and consumer services.

ii) To increase intermediate demand for producer services brought by industrial and production concentration in urban areas, such as finance, accounting, management, and R&D. For example, Singelman (1978), Riddle (1986), Harris (1995), Daniels (1998), Fujita et al. (1999), Rahman (2000), Tiffen (2003), Henderson et al. (2004) conclude that the continuous urbanization in developed countries does not only induce the tremendous demand for public services such as healthcare services, education services, and other consumer services, but more importantly, urbanization would bring the resources and production concentration in urban areas, thereby generating a great demand for producer services such as commerce services, transportation services, and finance services. The great demand would further promote output growth, the development of government services as well as other nonprofit service industries.

Chinese scholars have undertaken studies on the relationship between urbanization and services growth in recent years. Some literatures firstly make definition on urbanization. For example, Yan (2004), Gao (2006), Zeng, Liu and Cao (2008) define urbanization as the agglomeration process of nonagriculture industries in urban, the agglomeration of rural population to urban areas as well as the corresponding increasing number and enlarging scale of urban areas. They

emphasize that urbanization is a dynamic mechanism that causes great changes in industrial, employment and consumption structures in China.

Guo (2009) and Chang et al. (2009) believe that urbanization is an important driving force to promote services growth in China. They explain that the mobilization of population to urban and the industrial clustering effect caused by urbanization have saved transaction costs and improved the efficiency of services transactions, through which contribute to services growth. They further point out urbanization has created a lot of employment opportunities through the expansion of service sectors, thus increasing residents income. With the improved income, the modern urban life would further increase final demand for consumer services, such as hotel and catering services, retail services, entertainments, and private services. The increased demand would then promote services output growth.

Zeng and Yuan (2008) as well as Wei et al. (2010) analyze the relationship between urbanization and services growth in China. Their results revealed regional difference. Specifically, there is a significant positive relationship in both Eastern and Central regions, but the relationship is insignificant for Western region.

To summarize, these studies support that urbanization plays a positive role in services growth. As urbanization is a more recent phenomenon in China compared to other developed countries, the above studies pave basis for related studies in China.

2.3.3 Division of Labour

According to Adam Smith (1770, cited in Huang, 2004), the essence of division of labour is the division, specialization and independence of human economic activities. Young (1928, cited in Huang, 2004) defines the division of labour as the emergence of new industries and the extending of production chains. In other words, division of labour leads to diversification of economy.

Theoretically, literatures exploring the effect of division of labour on services growth mainly accent on the increasing intermediate demand for services, especially for producer services. For example, Singleman and Riddle (1978), Stanback (1981), Grubel (1989), Francois (1990), and Yang et al. (1999) point out that the mechanism of division of labor on services growth is mainly manifested in the tremendous intermediate demand for services, especially producer services. They state that different from consumer services such as hotel services and entertainments, which directly aim to meet final consumption demand and is directly influenced by people's income level, producer services provide intermediate input for other industries as well as for the services themselves. Thus the intermediate demand by other industries greatly determine their growth. The authors further explain that in the transition process of economic activities from manufacturing economy towards services economy since 1970s, producer services originally rooted from secondary industry, especially manufacturing sectors, to provide intermediate input for manufacturing activities. Producer services are therefore the result of division of

labour in secondary industry.

Transaction costs and supply chain theories also recognize the role of division of labour in promoting producer services growth. Bhagwati (1984), Greenfield(1996), Markusen (1989), Beyers and Lindahl (1996), Fuentes and Oulton (1999), Hark (1999), and Andersson et al. (2004) hold that, with deepening division of labour in the production system, the development of producer services is the result of services outsourcing or externalization activities by manufacturing enterprises. The reasons are as follows:

i. The deepening division of labour within manufacturing sectors leads to a prolonged producing chain, and increased complexities in production procedures. Consequently, this induces demand for producer services as intermediate input in production, such as finance, distribution, commerce maintenance, and management.

ii. The deepening division of labour results in an increase in transaction costs. In order to decrease transaction costs and to realize economies of scale effects, manufacturing enterprises would outsource some of their internal services activities such as marketing, R&D, design, and accounting, to other specialized services companies. These outsourcing or separation activities would in return spur the independent growth of producer services.

Some studies on input-output analysis further reveal the intermediate producing

functions of producer services on other industries, especially secondary industry. Karao and Carlsson (1999) calculate the intermediate demand rate of producer services by manufacturing sectors in USA during 1987-1994. They find that an average 48 percent of outputs of producer services were invested as intermediate input into secondary industry. They conclude that producer services had great intermediate producing functions for secondary industries. Thus, with deepening division labour, more intermediate demand for producer services would be required by manufacturing sectors, hence driving the growth of related services.

Similarly, Cheng (2008) calculate the intermediate input rate of services in US during 1991-2004. He finds that the average intermediate input rate of services into secondary was 38.1 percent. However, different from Karao and Carlsson (1999), he notes that about 62 percent of producer services in US were for service industry instead of secondary industry. He argues that, as US entered into the stage of services economy, the higher intermediate input ratio into services might be due to high proportion of services. Therefore, the main function of services was not to provide intermediate input for manufacturing sectors but for the production and consumption of service sectors.

Division of labour is by essence manifested in the improvement in specialization degree. Therefore, literatures tended to adopt specialization index to measure division of labour. Hoover and Giarratani (1984) designed Hoover Specialization

Coefficient, which is used as an indicator for measuring the division and specialization level of a specific industry in a region, that could further reflect the development level of specific industry. The basic equation is as follows:

$DIV_i = Hoover_i = 1/2 \sum |E_i^k / \sum E_i - \sum E_i / \sum iE_i^k|$

where

i: region i
k: industry k
E_i^k: the employment in industry k of region i
$\sum E_i$: the total employment in region i
$\sum iE_i^k$: the total national employment in secondary industry

The value of the coefficient ranges between 0 and 1, where a higher value indicates the more deepening division of labour in that industry.

Krugman (1991) designes Krugman Dissimilarity Index to measure industrial dissimilarity between the regions, hence, further reflecting the degree of division/ specialization of labour between the regions. Basic equation is as follows:

$$S_{jk} = \sum_{i=1}^{n} \left| \frac{q_{ij}}{q_j} - \frac{q_{ik}}{q_k} \right|$$

where,

j and k: region j and region k, respectively
i: industry i
q_{ij}: added value of the industry i in region j
q_j: total output value of the industry i in region j
q_{ik}: added value of the industry i in region k
q_k: total output value of industry i in region k

The value of the Krugman Dissimilarity Index ranges from 0 to 2, where 0 indicates that all regions in comparison have similar industrial structure, and there is no division/specialization of labour between the regions. The value of 2 indicates that all regions in comparison have nothing in common in terms of industrial structure, indicating a completely division/specialization of labour in the region. Consequently, Fan (2011) concludes this index as the sum of absolute differences between a region's production shares to the average value for all other regions.

It is evident that division of labour can influence services especially producer services growth, particularly in China. Zheng and Xia (2005), Cheng and Chen (2006), Gu and Ren (2006), Chen (2009), and Hu et al. (2009) theoretically illustrate the mechanism of division of labour in manufacturing industry on producer services growth in China. They hold that, as China entered into post-industrialization period, the division of labour in secondary industry rapidly deepened. At the microeconomic level, the production modes in manufacturing sectors began to change from mass production to customized production and then to mass customization. In order to enhance the core competitiveness in the process of industrialization, manufacturing firms began to outsource some of the intermediate

services to outside market, thus promoting the development of producer services.

Gu (2008) and Bi (2009), Li et al. (2009), using value chain theory, explain the mechanism of producer services growth in China. They state that, the producing chain in manufacturing industry is an “U” shape and also known as the “smiling curve” (Figure 2.10).

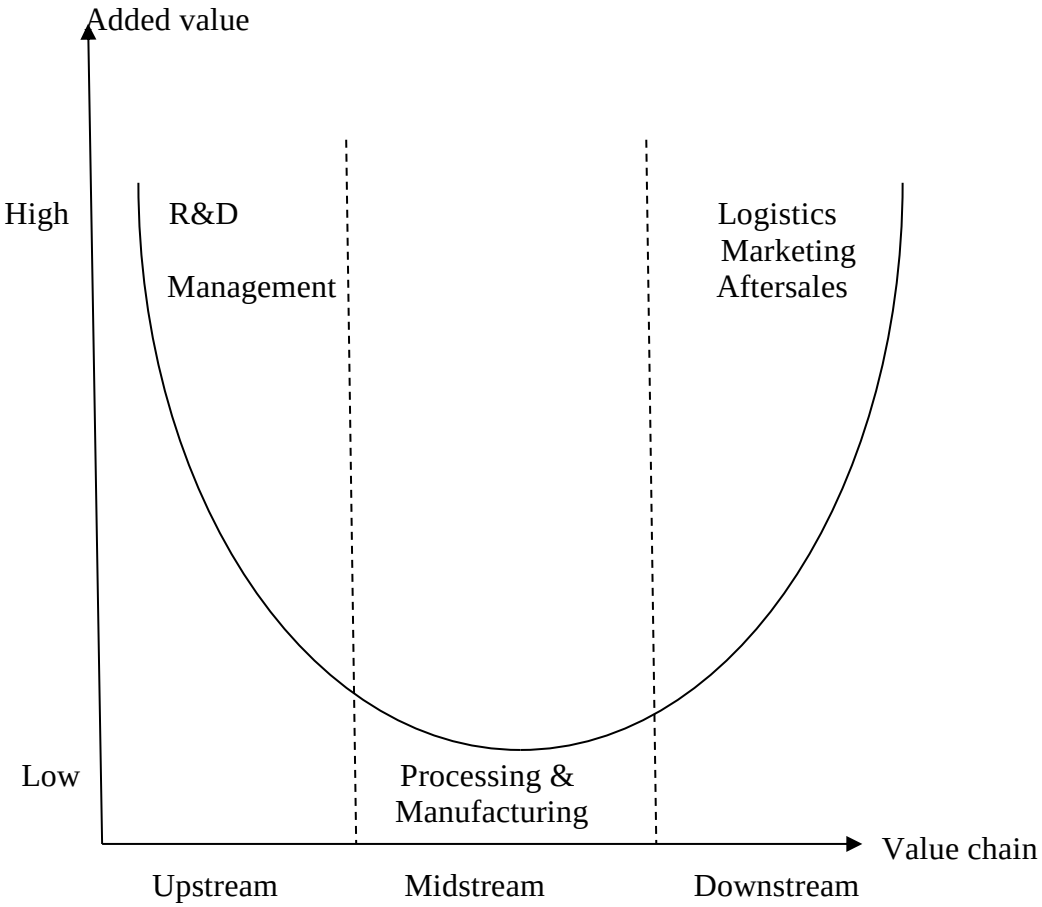


Figure 2.10

The 'Smiling Curve' in Manufacturing Sectors Value Chain

Source: Li, S.T. & Gao, C.S. (2009). *Producer Services and Manufacturing Industries Upgrading in China*. Shanghai: Shanghai Press.

As Figure 2.10 shows, the two top ends of the smiling curve are the upstream and downstream linkages of producing activities. They are generally high value-added producer service activities, such as R&D and management for upstream, and such as logistics, marketing, and after-sale services for downstream. Other than that, the bottom is the midstream linkage of production, which is mainly composed of low value-added manufacturing, processing, and assembling activities. With deepening division of labour in manufacturing sectors, the producing chain is prolonged and the profits are gradually shifting towards producing services sectors at the two top

ends of the producing chain. Consequently, this profit shifting promote rapid development of producer services.

Basing on the "Smiling Curve" theory in manufacturing sectors value chain, some empirical studies have been conducted to examine the relationship between division of labour and producer services growth. For example, Fan (2007) adopted Hoover coefficient and Krugman Dissimilarity Index to measure the division of labor in the manufacturing industry in China. Using data for 25 manufacturing sectors, he finds that, the division of labour in manufacturing industry was greatly improved during 1985-2008. However, there were regional gaps, with highest one in the Eastern region, followed by Central region, and the lowest was in Western regions.

Later, followed Fan (2007) and Liang et al. (2011) examined the relationship between division of labour in manufacturing industry and producer services growth in Eastern, Central, and Western regions using provincial panel data of 2001-2007. They find a significantly positive effect of division of labour on producer services growth. However, in accordance with the regional gaps in division of labour, there was also regional imbalance concerning its effects on producer services growth, with the highest in the Eastern region (with coefficient of 0.1523), followed by the Central region (0.1083), and the lowest in the Western region (0.075). Their result further reveal the fact that division of labour in manufacturing sectors has an important effect on services growth in China.

Cheng and Chen et al. (2010) used the national input-output table of 2008 to calculate the intermediate input rate of services in China during 1997-2007. They explain that the intermediate input rate of services is an index to measure the intermediate input degree of services in producing activities. Higher rate implies that a higher proportion of services is used as an intermediate input in productions, indicating a close industrial correlations by division of labour.

Moreover, the analysis by Cheng et al.(2010) also shows that the average intermediate input rate of producer services in secondary sectors was 0.67, indicating that 67 percent of producer services output was reinvested as an intermediate input into secondary industry. The average intermediate input rate into services was 0.3, indicating that 30 percent of producer services was reinvested as an intermediate input into services. Contrastingly, the average intermediate input rate into agriculture was only 3 percent.

The result by Cheng et al. (2010) further justifies that, although China is now at the post-industrialization period, the producer services are still highly dependent on secondary industry that is different from developed countries, that have entered into services economy, and producer services are mainly inputs into services sectors. They conclude that the effect of division of labour on services growth is mainly the intermediate demand that brings up the effect by division of labour in secondary industry in China.

Thus, it is theoretically accepted that at the current post-industrialization period of China, the deepening division of labour in secondary industry has a significant influence on services growth.

2.4 Supply Factors of Services Growth

Supply elements of services growth in this study refer to the producing factors that could influence (or determine) the output of services. Classical and Neoclassical Growth Theory and Endogenous Growth Theory lay the theoretical foundations for the relationship between supply factors and services growth. Classical economists have recognized the functions of physical capital and labour in output growth. Adam Smith (1776), Ricardo (1817), and Harrod et al. (1939) state that labour and physical capital formations are the main sources for total output growth of an economy. Basing on this notion, the Neoclassical Growth Theory, which is supply-oriented, is further developed to explain economic (output) growth, and is therefore set mainly in the context of an industrial economy. For example, in the spirit of a neoclassical framework, Solow (1956) in his traditional growth model makes some fundamental assumptions that output is related to capital, labour and technical changes. Solow (1956) emphasizes two main factors in production, namely capital and labour. The theory is therefore primarily concerned with the way that output growth is influenced by the input of labour (assumed to be given exogenously) and the growth of physical capital accumulation due to investment.

The Endogenous Growth Theory (Romer, 1986; Lucas, 1988; Barro, 1991), which emphasizes the role of human capital accumulation and externalities, insists that human capital has become an important source of technological progress and output growth. Romer (1986) and Lucas (1988) extend the neoclassical model (Solow Model) by including human capital, skills, and knowledge, factors of which make workers productive, into analysis. They hold that there are four basic factors in production and output growth, namely physical capital, unskilled labour, human capital (which could be measured by the length of education time), and innovations. Among these factors, human capital is deemed as an important power for economic growth for the reason that it could not only bring increasing returns to scale effect for itself, but could also induce physical capital and unskilled labour to generate this increasing returns to scale effect to assure a long- term economic growth. In other words, human capital lays the foundation for the effective functions of unskilled labour and physical capital.

Shed by those theories, several literatures have applied them to the domain of service industry to explain the relationship between supply factors and services growth. However, the works rely heavily on the relationship between labour input (or internal employment structure) and services growth (Baumol, 1967; Koichi & Emi, 1978; Elfuringet, 1989; Godbut, 1993; OECD 2001; Goodman et al., 2002).

For example, Baumol (1967) comes up with “cost disease theory” using the

intra-sector differences in labour productivity. The author analyzes the effect of labour productivity on services growth. He claims that the factor determining services growth is not demand, but the supply factors, or specifically the intra-sectors' labour productivity differentials. In his cost disease theory, he hypothesizes that:

i. There are two main economic sectors namely (1) manufacturing sector with increasing technological progress and labour productivity and (2) service sectors with stagnate technological progress and constant labour productivity.

ii.Wage would rise with improvement in labour productivity in technological progress (manufacturing) sectors.

iii. Wages in two sectors tend to converge to reach equilibrium in the long run.

iv. Demand for services depends more on income elasticity rather on price elasticity.

Moreover, Baumol (1967) states that if the output share of these two sectors remains unchanged, then service sectors would take up all social labour resources because of service sectors stagnate labour productivity. Furthermore, if wages in service sectors increase in line with the social average wage, then the labours would continuously shift from manufacturing sectors to services sectors, thus driving the output growth in service sectors. However, such an increase would not reflect a great demand for services, but rather "technological stagnancy" and costs would increase in services production.

Some empirical studies have examined the effect of employment on the output structure of services. Koichi and Emi (1978) studied the employment structural changes in Japan's services during the 1970s. They found that highest employment growth in service sectors was producer services, while employment in consumer services tended to stagnate. They also believed that the rapid employment growth in Japan's producer services directly promoted the fast growth of producer services.

Gershuny and Miles (1983), by dividing services into producer services and consumer services, also come with the same conclusion. Through regression analysis on the relationship between services' employment structure and services output structure in Britain, France, Germany, and Italy during 1920-1970, they found that the continuous decline in the proportions of employment in consumer services led to the decline in their output. Moreover, the increase in the proportion of employment in producer services contributed to the growth of producer services.

Elfuring (1989) also found that during 1959-1984, the average services' employment growth rate in the United States was 2.6 percent, with a services average output growth rate of 4.0 percent. At the same time, the proportion of employment in transportation services to total services employment decreased from 6.3 percent to 5.1 percent, resulting in a decrease in transportation services output growth rate to only 1 percent, far lower than services' total average growth rate. At the same time, by comparison, employment in producer services showed an increasing trend with an

average growth rate of 3.1 percent. Accordingly, the output growth rate of producer services rose from 2.1 percent in 1959 to 4.4 percent in 1984, above the whole services' average growth rate. Similarly, a common conclusion from OECD (2001), and Goodman et al. (2002) is that the rapid labour movement towards services directly contributed to services growth.

Wei (2010) compares the labor participation rate in urban services for 30 provinces in 2009, and finds that the city with the highest services' labour participation rate registers the highest value-added urban services. Relatively, the city with the lowest urban services' participation rate also had the lowest value-added urban services. Thus, it can be concluded that urban services growth is positively influenced by labour input in services.

Li (2008) examined the effect of domestic fixed assets investment on services growth. Based on the provincial data in 2007, he made a cross-sectional regression analysis on the relationship between domestic fixed assets investment and urban services growth. The result indicated that fixed assets investment in urban services is positively related to urban services. Furthermore, he found that the amount of fixed assets investment in urban services varied greatly among cities from 30 provinces in China. The economically developed Eastern provinces had the highest fixed assets investment, while the lagged Western provinces had the lowest physical capital investment. Accordingly, the per capita urban services output value was higher in

Eastern region compared to Western region.

Some studies have begun to pay attention to human capital as important in industrial growth. Hu (2008) and Wei et al. (2010) divide employees into four groups, using the average education years ranging from no schooling to complete higher education. See Table 2.4.

Table 2.4
Type of Employees with Different Levels of Education

Education Level	**Schooling Years**
No	0
Complete Primary Education	6
Complete Secondary Education	12
Complete Higher Education	≥16

Source: Wei, Z.L. (2010). Human Capital and Services Growth in China -An Empirical Analysis. *Statistical Research (5)*,12-24.

Hu (2008) and Wei et al. (2010) further define employees with higher education (i.e., with more than 16 schooling years) as human capital.

However, as there are no official statistical data on the employees with college education in urban services in China, Hu (2008) and Shen et al. (2008) used the stock of population with college education in urban as a proxy for the measurement of potential human capital stock for urban services.

Yang and Su (2009) used the Stochastic Frontier Production function model (SFP)

and the panel data of 1993-2003 to examine the relationship between labour quality in services and regional services growth in China. Their findings indicate that the differences of labour quality in the Eastern, Central, and Western regions were the main causes for differences in regional services growth. The Eastern region with a relatively higher labour quality (or had more human capital) had the highest services growth rate, while the Western region lagged in services growth as the region had lower labour quality or lower human capital than the other two regions.

Gu (2008), Zeng (2008), and Zhang et al. (2009) used the average education year as a proxy for human capital to analyze the effect of human capital on the growth rate of total factor productivity (TFP) of producer services in China. The result showed that the growth rate of TFP in producer services turned on increasing tendency, and human capital directly contributed to TFP growth through technological progress effect.

To summarize, the Chinese literatures have recognized the positive role played by labour and physical capital in services growth. In addition, the critical role of human capital has received some attentions in recent studies. However, the effects of services' productivity, a measurement of factor allocation efficiency, have been neglected. Therefore, this study aims to extend previous studies by including the factors' productivity as one of the important supply elements for urban services growth in China.

2.5 Institutional Environments Factors

The New Institutional Economics, which takes institutional factors as endogenous rather than exogenous variables for economic (output) growth, lays the theoretical foundation to explain the relationship between institutional factors and services growth in this study. North (1990) defines institutions as a kind of behavior rules in social, political, and economic activities. North (1990) firstly introduces institutional variables as main factors of economic and industrial evolution, and criticizes that the Solow Model (the traditional growth theory) neglects institutional factors under the assumption of symmetric situation in all sectors of the economy, which is unrealistic in real world.

North (1990) attributes economic growth and industrial evolution as results of an effective institutional system. He holds that innovations, education, and capital accumulation are not the sources but the content of economic growth. In fact, institutional environment factors are the basic determinants for long-run industrial and economic evolutions. He further explains that institutional environments are characterized by path dependence. Similarly, the industrial evolution in a country also possesses the prosperity of high path dependence. Thus, an effective institutional environment is the premise for improvement in resource allocation efficiency. Any industry without the support of an effective institutional environment could not promote economic growth effectively.

Scully (1988) and Olson et al. (1996) state there are three main mechanisms for a favorable institutional environment in promoting industrial evolution:

i. By improving transaction efficiency by reducing transaction costs;

ii. By integrating factors of production effectively, thereby promoting economic growth and industrial evolution; and

iii. By promoting technological progress under the clearly defined and well-protected property rights that pave the basis for free competition in the market.

Yang et al. (2000) incorporate institutional factors into Endogenous Economic Growth Model. The model also supports that favorable institutional environments such as perfect market mechanism, high economic freedom, and low government intervention in market transactions could promote the effective utilization of resources to improve productivity and to decrease transaction costs, hence contributing to industrial and economic growth.

Although North (1990), Scully (1988), and Olson et al. (1996) point out the importance of institutional factors in economic growth, they fail to design specific variables to measure the institutional environment. Later, some scholars have conducted studies on the measurement of institutional environments factors. For examples, Dawson (1998), Globerman and Shapiro (2000; 2002), Benassy (2005), and Gwartnet et al. (2006) use “Economic Freedom” as a measurement of

institutional environments. They conclude that economic freedom could be measured by the proportion of private investment (including both domestic private investment and private FDI) to GDP, as the higher economic freedom indicates low government control on capital movement that has positive effects to attract private invest (especially inflows of FDI).

Heckelman (2000) uses government intervention degree, which is measured by the proportion of governmental expenditures to GDP, as a proxy for economic freedom. He holds that the high proportion of governmental expenditures to GDP implies higher governmental intervention in economy, thus lower degree of economic freedom. He further suggests that, except for the low governmental intervention in economic activities, economic freedom system should also include free trade, free capital movement policies, and no governmental regulations on wage, price, and others.

Some researchers such as Bergson (1989), Grossman and Helpman (1991), Edwards (1998), Stern (2003), Stecher (2005), Julio (2005), and Doucouliagos et al. (2006) use economic openness level (international trade and FDI) as a measurement for economic freedom. They further explain that economic openness could enhance total factor productivity (TFP) improvement through the following channels. First, international trade enlarges the available variety of intermediate goods and capital equipment, which can expand the productivity of the country and other resources.

Second, international trade allows intensification of capacity utilization that increases products and consumption. Third, the entry of foreign direct investment (FDI) will increase capital formation, and will bring significant resources into the host country, such as management, skilled production labour to international production networks, technology transfers, and spillover effects.

China is currently in its transition towards market economy period, therefore the institutional factors are important in services growth. However, most prior studies related to institutional environment factors mainly focus on the effects of institutional policies, especially marketization transformation policies and opening-up policies on the total macroeconomic growth in China, while specific studies on the relationship between institutional factors and services growth are few. For examples, Lu and Hu (1994), Lin (2004), and Wang et al. (2005) point out that government's gradual withdrawal from economic activities and reduction of government investment in production since 1978, have improved the macroeconomic efficiency and created a favorable institutional environment for nonstate-owned economic components in China. The favorable institutional environment brought positive contributions to economic growth. They further explain that the institutional evolution marked by the process of marketiztation is a powerful driving force for China's sustained and rapid economic growth as it provides an effective incentive and restraint mechanism for effective resource allocation. The increased proportion of nonstate-owned components in market economy makes the property rights clear, and thus improves

the efforts of the owner of property right. The development of nonstate economy breaks the monopoly of state-owned economy, thus helping the pro-competitive mechanisms to play a role.

There are also empirical studies on the measurement of institutional environments. Fan and Wang (2001) build the Marketization Index to measure the institutional environments in China. They explain that "Marketization" refers to the transformation process from planned economy to market economy with a series of economic, social, law, and even political transformation in China. Wang (2008) constructs a National Market Index, and makes a cointegration analysis on the relations between marketization index and industrial evolution. The results indicate that the marketization process plays an important positive role for economic growth and industrial evolution in China.

In general, these researches reveal the importance of institutional environment for economic growth in China, and lay the basis for studies on the relationship between institutional factors and services growth. Hu (2008) states that since opening up in 1978, the improvement in institutional environments had generated great positive effects on services growth. Before economic reforms, China had attached too much attention on the development of secondary, especially manufacturing industries under the high-planned economy and the biased Industrialization Development Strategy. Services had since then been neglected and monopolized by central government, thus

greatly limited their growth. Since reform and opening up (especially after the setting up of marketization economy in 1992), the market mechanism has been playing increasingly important role in resources allocation, and the nonstate-owned services have received rapid growth. Thus, the monopoly of state-owned services has been broken, and services productivity has shown a great improvement.

Hu (2008) takes the proportion of nonstate-owned services enterprises' industrial output value to national industrial output value as a measurement of marketization degree. Based on the data of 1992-2005, she finds that for every percentage increase in marketization degree in services, the average per capita value-added services would increase by RMB15.

Hu and Ma (2012), Yan and Wang et al. (2013) took the proportion of public services fiscal expenditure to total fiscal expenditure as a measurement of marketization degree in public service sectors. They hold that the decreased proportion implied the improved marketization degree in the public service sectors. Their analysis found that the improvement in public services marketization degree would greatly improve the efficiency of public services, thereby increasing public services supply and improving governmental efficiency.

Wei (2009) holds that services openness level, measured by foreign trade on services, also has a positive effect on its growth. He examines the relationship between foreign

trade in services and services growth using Vector Regression Model and Granger Causality Model with time series data from 1998 to 2008. He finds that since China's entrance to WTO in 2001, services have been gradually opened up to the world's market. Thus, the role of services openness in services growth has been increasingly important, generated for the expanded market and knowledge, as well as the technology spillovers effects.

Huang (2009) finds that FDI in services has promoted the improvement of technological efficiency as well as services total factor productivity in China. The services total factor productivity rate increases by 7.61 percent on average during 1992-2007. The capital elasticity of services' output was significantly greater than labour elasticity, which also indicates that the growth of services output depends heavily on capital investment in China. Therefore, he suggests that the absorption of foreign direct investment in service sectors could make up for the insufficient local capital investment as well as promote services growth by expanding factor inputs.

Similarly, Hu (2011) comes to the same conclusion using the Stochastic Frontier Production Model with panel data of 1992-2007 from 30 provinces (municipalities) of China to examine the impact of FDI in services on services total factor productivity. The result shows that FDI in services plays a positive role in promoting services' total factor productivity. She also notes that improvement in total factor productivity varies in different regions, with the highest in Eastern coastal region,

followed by Central and Western regions.

Zhao and Wu et al. (2013) used panel data of 2002-2012 of 30 provinces to analyze the capital accumulation and technological spillover effects of FDI in services for China. They found that FDI had generated significant capital accumulation effect on services growth. However, the technological spillover effect was negative, due to the insufficient supply of high quality factors (such as: core technology, innovations and technological progress) and the inferior internal structure of services.

As China now is in its institutional transition period, services growth should be influenced by institutional factors. However, most studies on the relationship between institutional factors and services growth are country-based. Thus, this study focuses on positive role of institutional factors on urban services in China by taking service marketization and services openness level as measurements of the institutional environment variables.

2.6 Services Spatial Agglomeration

Services agglomeration is a phenomenon of services' concentration in space. Services agglomeration particularly emphasizes its evolution process from spatial decentralization to centralization. Therefore, industrial location theories in New Geographical Economics lay the theoretical foundation for explanations of services spatial agglomeration.

Research on the theories of industrial location can be traced back to Adam Smith (1770 cited in Huang 2004). Although he mentions about the phenomenon, he does not give a clear concept on agglomeration. Alfred Weber (1929), a German economist, is one of the earliest researchers to develop an industrial location theory. He is primarily interested in the location issues of manufacturing firms, and points out that the basic principle for firms to choose a location is to minimize costs and therefore to maximize profits, and this notion lays the theoretical foundation for further studies.

The research on services' spatial location originated from a Germany economist, Christaller's "Central Place Theory" (1933). The theory justifies that the services should be located as close to consumers as possible. Christaller (1933) defines the center place as a relatively larger place surrounded by many smaller towns. As a service center, the basic function of the center place is to provide goods and services for final consumption.

Since technological progress and industrial development in 1960s, the increasing proportion of producer services in economy has attracted wide academic attentions. Especially the spatial location of producer services has been widely studied. Daniels (1975) points out that, compared with other industries, services are characterized by the simultaneous occurrence of production and consumption, as well as the nonstorage of the products. Therefore, the location of services has its own

characteristics. He further argues that factors such as transportation costs and demand distribution that affect the spatial location of services can be summarized by Central Place Theory. This theory can only be applied to consumer services, and not to producer services. Alonso (1964) proposes the Rent Model Theory, and explains that different service industries would choose different location due to the different abilities to pay rent. Advanced producer services with the ability to pay higher rent are often located in the city center with most favorable conditions. Other than that, services that occupy large area and have low ability to pay rent and low sensitivity to information and market would generally be located in the suburbs.

Scott (1970) firstly conceptualizes services' spatial agglomeration. He points out that, different from manufacturing industries, the vast majority of services' products are consist in both production and consumption. Therefore, the saving of producing and transaction costs is no longer an important factor affecting the concentration of services' enterprises. The shared producing resources and market demand and the resulting improvement in sales and prices of service products have become the ultimate goal of the services' agglomeration.

Keeble and Wilkinson (2000) and Nachum et al. (2002) summarize four factors promoting services' agglomeration. First is the factor of group learning effect. They hold that services, especially the knowledge-intensive producer services, could promote innovations through group learning mechanism, and thus bringing high

revenues and attracting services' agglomeration. The second one is social environmental factors. In the context of globalization, service enterprises have been incorporated into the global network. A good credit and international social atmosphere promotes business services to agglomerate in some of the international metropolis. The third factor is the share of labour and human capital resources. Keeble and Wilkinson (2000) and Nachum et al. (2002) further explain that labour and human capital are important inputs in the services' earnings. Moreover, the shared labour market can contribute to factor mobility, saving the cost of personnel transactions, and thus strengthening the degree of services' agglomeration. The final factor is the co-agglomeration of service industries. From consumer's perspective, the various service industries such as catering service and entertainment services in the common agglomerated area have complementary and competitive relationships in demand. Therefore, the spatial agglomeration of different service industries also contributes to services' concentration.

As urban areas are the main gathering places of services, services are not only likely to locate in such places, but also tend to agglomerate to obtain effect of agglomeration economies. Thus, the tendency of services spatial agglomeration in urban has attracted the interests among researchers (e.g., Hirsch, 1973; Sveikauskas, 1975; Segal, 1976; Moomow, 1986; Ciccone & Hall, 2002; and Henderson et al., 2003).

Hirsch (1973), Sveikauskas (1975), Segal (1976), and Moomow et al. (1985) point out the reason for services to agglomerate and develop in urban areas, as the urban economy has special advantages in scale economies and agglomeration economies. Urban areas are places with developed specialized producing system, high agglomeration with capital, human capital, and technologies. Thus, services agglomeration can bring two apparent benefits that could improve services productivity, namely the economies of scale and agglomeration benefits.

Similarly, Ciccone and Hall (1996; 2000) note that for services to achieve economies of scale effect, they do not only depend on the technical conditions, but also on market conditions. Only when the market demand is large enough could the services access the range of scale economies. Therefore, for nonresource-dependent services, it is beneficial to arrange a production close to the market. The city is a system with complex economic, social, and ecological connections. The city is also a place with enormous producing ability and purchasing power, thus there is a great possibility for services to achieve economies of scale benefits.

Henderson (2003) points out that another most prominent superiority for services agglomerating is to achieve agglomeration economy, which is a kind of external economy brought by a number of enterprises gathered in the same place. When service enterprises are clustered in the same place, the demand for intermediate inputs will be enlarged, thus would promote the specific production of raw materials

to achieve economies of scale effect, thereby reducing production costs of services. The agglomeration of services' enterprises could also attract professional workers to gather at the same place, thus promoting the formation of professional labour market and reducing the cost of searching professional labours and the cost of labour flow for service enterprises.

Some researchers have also studied the spatial agglomeration characteristics of different service sectors in developed countries. It is generally recognized that producer services are prone to agglomerate in urban areas. For example, Grubel and Walker (1989) analyze Canada's services development in the 1980s, and recognized the regional imbalances in its spatial distributions, that had affected regional disparities of income and economic growth between urban and rural areas, as well as disparities between the eastern and western regions. They further point out that producer services such as retail services, computer services, and engineering services are only possible to exist in metropolitan areas where the high population density can provide enough large market. Therefore, the services are increasingly agglomerated in large cities, thus further promoting urbanization.

Berkoz (1998), Baldwin (1999; 2000), and Baldwin and Ottaviano (2001) explain the reason for producer services agglomeration in urban areas in Europe. They point out that the knowledge-intensive producer services such as financial services, law, management, consulting, and R&D services generally require frequent face-to-face

contacts for the smooth exchange of information between customers, while the city center areas are the places with well-developed infrastructures to meet these requirements, thereby attracting agglomeration of producer service enterprises.

Empirical studies on services agglomeration have been conducted around two aspects namely its measurement and its effect on productivity. Ellison and Glaeser (1997) design an EG Index as a measurement of services agglomeration. The EG Index is constructed as a control for differences in the size distribution of plants across industries. In principle, the index displays to what extent regional concentration deviates from a "dartboard" distribution of production. When the value of EG Index of a specific industry is below 0.02, it indicates scattered distribution. When the value is between 0.02 and 0.05, it indicates the industry is distributed uniformly, while the values of above 0.05 show a high agglomeration.

Location Quotient (LQ) Index is another widely used measurement for services agglomeration. The index, which was firstly proposed by Haggett (1962), is an index to measure the specialization and agglomeration degree of an industry in a region. The index compares the proportion of a particular industry within the local economy to the proportion of that same industry within national economy (Miller, 2001). The industrial agglomeration level increases with the increased index. Specifically, when the value of LQ is above 1, the industry is recognized to have a high level of agglomeration. Grimes, Prime and Walker (2007) studied the agglomeration of

computer services during 1990-1997 in US using the LQ. The results showed that more than 70 percent of the computer services were concentrated in the capital city, with an index of greater than 1, while the value was less than 1 in nonurban districts.

Related empirical studies on the effect of services agglomeration mainly focus on its effect on labour productivity. For example, Ciccone (2002) uses the services' relative density indicator as a proxy for services agglomeration. In his study, services agglomeration is measured by services output value per square kilometer of a region. Higher value implies higher services spatial agglomeration degree. He further introduces services' relative density indicator into Cobb-Douglas production function to examine the relationship between services density and services productivity in US during the 1990s. He finds that services relative density is positively related with services productivity (with the coefficient of 0.04). He further explains that higher services density implies larger available variety of intermediate services, thus the denser services would improve services' capital-labour ratio as well as its productivity. Similarly, the studies by Dekle (2002), Ottaviano and Pinelli (2006), Mitra and Sato (2007), Geppert (2007), and Brulhart et al. (2009) come to the same conclusion that services spatial agglomeration contributes to improvement in services Total Factor Productivity (TFP).

Various studies in China focus on the effect of services agglomeration on services growth. For instance, Ji (2004) makes an empirical analysis of the industrial

agglomeration in Chinese cities. The results show the significant agglomeration tendency in the secondary and service industries. Relatively, the services agglomeration is more sensitive to urban areas (i.e., more easily agglomerated in urban areas) compared to manufacturing industries. Other than that, Zhang (1999), Cheng and Huang (2005), Jiang (2007), Li and Tan (2008), Fan (2008), and Gao et al. (2009) explain that cities with advantages of abundant information, well-developed economic basis and infrastructures, and great market capacity are easy to attract services agglomeration to achieve agglomeration economy effects.

Cheng and Chen (2005) design the services relative intensity index to measure the services agglomeration, i.e., the ratio of services output per unit area in region ‘i’ to the nationwide services output per unit area. Higher value of the index implies higher degree of services agglomeration. They find that there are regional disparities for degree of services agglomeration. The services’ relative intensity index is the highest in Eastern Coastal region with an average index value of more than 1, followed by Central region with an average index value of 0.5, and the lowest is in Western region with the average index value of 0.29.

Hu (2008) and Hu and Wei (2009) use LQ to analyze urban services agglomeration in China. They argue that the average LQ of urban producer services is 1.58, higher than that of consumer services with LQ of 0.75. The results reveal that producer services have a higher agglomeration degree compared to consumer services. Chen

and Zhang (2010; 2011) and Guan and Gao (2011) use LQ to analyze the urban services agglomeration among regions, and find that there are regional differences. The average LQ in the Eastern urban region is 1.35, higher than that of the Central urban region with average LQ of 1.08, and Western urban region with an average LQ of 0.98.

Chen, Yang and Wang (2008), Ke and Yao (2008), Liu (2009), Hu and Wei (2009), Tong (2010), Guan (2012), Wang and Fan et al. (2013) also use LQ index to empirically estimate the effect of services agglomeration on total factor productivity (TFP). Their results show that services agglomeration significantly contributes to the improvement in TFP through the positive agglomeration of economies effect.

To sum up, it is evident that services have a high tendency to agglomerate in urban areas and benefit productivity improvement. While several studies have focused on the effect of agglomeration on services growth, the present study includes the variable of services agglomeration to examine the effect of agglomeration on urban services growth in China.

2.7 Services and Regional Economic Growth

Theoretically, there have been controversies among literatures on the relationship between services and economic growth. Earlier studies in 1960s-1980s, hold that services play a passive role in the economic growth, as the technical progress in

services is more stagnant compared to manufacturing industries. Indeed, the expansion of services would even hinder economic growth. Kaldor (1966) and Galbraith et al. (1967) hold that the engine of future economy is still driven by manufacturing industries instead of services as the majority of innovation-enhancing productivity occurs in manufacturing industries. However, as the services' technological progress rate is lower compared to manufacturing industries, the expansion of services tends to occupy social resources and reduce the overall productivity, thereby reducing the long-term economic growth.

Based on his cost disease theory, Baumol (1967) groups economic sectors into manufacturing sectors with increasing technological progress and service sectors with technological stagnation. He states that the main reason for price rising in services is because the labour productivity in services lags behind the manufacturing sectors. Accordingly, services' price tends to rise without bound, but the proportion of real demand for services remains unchanged, and these rising prices would lead to employment shifts from manufacturing sectors to services, thus giving rise to deindustrialization problem and consequently the aggregate productivity growth of the economy declines. Thus, the economic growth slows down eventually. An increase in the proportion of service sectors therefore negatively impacts on total productivity or economic growth.

On the contrary, with rapid growth of services since 1990s, Baumol's theory has

received great oppositions. The development of Transaction Cost Theory in late 1990s provides a new theoretical basis for services' positive effect on improving economic productivity. For example, North (1990) argues that the classical and new classical theories have failed to notice the concept of transaction cost. Instead, he proposes that, in manufacturing process (except for the manufacturing cost in production), the transaction activities also generate costs. Therefore, total costs are actually the sum of manufacturing costs and transaction costs. Owing to deepening division of labour, the producing chain is prolonged and the transaction activities are enlarged, therefore the proportion of transaction costs in total costs would increase. North (1990) also argues that services, especially producer services are not only used for final consumption, but also for intermediate inputs in the manufacturing activities such as R&D, management, accounting, financing, logistics, and marketing. Compared to the transacting service activities provided by manufacturing sectors themselves, the externalized and independent services enterprises could provide more specialized transaction services with higher efficiency and lower cost. Therefore, the development of service industry especially producer services is beneficial for the manufacturing enterprises to reduce their transaction costs and to improve production efficiency, thereby promoting output growth. Furthermore, through calculation, North (1990) finds that during 1960s-1980s, the share of producer services intermediate input rate in US manufacturing sectors increased from 15 percent to 45 percent. Meanwhile, the corresponding total factor productivity (TFP) growth rate in US manufacturing sectors improved from 0.04 percent to 0.87

percent. Therefore, North's (1990) study further indicates that services, especially producer services, could promote output growth by improving factor productivity.

Meanwhile, there are several empirical works on the relationship between services and economic growth. Earlier studies in 1960s-1980s were conducted to justify Baumol's theory on the negative role of services to economic growth. For example, based on time series data of 17 countries consisting of 14 developed and 3 developing countries, Kuznets (1971) finds that there is no linear relationship between economic growth and the proportion of service industry, as well as no significant positive trends between them. Similarly, Summers (1985) uses the time series data of 34 countries during 1975-1980. He takes per capita real GDP as a dependent variable, and services output as an independent variable to regress the effect of services on GDP growth. The study concludes that there is an insignificant positive correlation between services output and per capita real GDP growth, thus implying that the contribution of services towards economic growth is not a simple linear relationship.

However, since 1990s, various studies have seemed to support that services play a critical role in fostering modern economic growth. Griliches (1994) points out that Baumol's cost disease theory is the result of incomplete statistics on services, as it only includes final consumer services without producer services. Griliches (1994) argues that about one-third to half of output value of services is used as intermediate

inputs into production. Thus, services contribution to economic growth is intangible and underestimated.

Triplett and Bosworth (2002) calculate the growth rate of labour productivity in 27 services sector in US during 1995-2001. They find that the average annual growth rate of labour productivity was 2.7 percent, which was higher than manufacturing sectors of 2.3 percent. Among the 27 services, 17 services had annual growth rate of 3.0 percent, higher than the average 2.7 percent. The result rejects the Baumol's cost disease theory. Instead Triplett and Bosworth (2002) hold that services are sectors with low technical progress and productivity, or indeed the *disease* has already been settled.

Oulton (2001) re-examines the role of services in economic growth by expanding Baumol's cost disease theory through introducing services as intermediate inputs in manufacturing sectors. He thinks that even if the resources shift towards the stagnant intermediate service sectors such as financial and business services that have slow productivity, the aggregate growth rate of productivity may still rise instead of fall. He explains that such a shift would raise the contribution from these services towards the aggregate productivity without reducing the contribution from the manufacturing industries. He further argues that, provided the productivity growth in these stagnant intermediate services industries is positive, there would be no slow down in aggregate growth, but rather a speed-up. Hence, the development of services would

not hinder economic growth, but in return, enhance the economic growth rate to a certain level.

Similarly, Pugno (2006) amends and expands Baumol's cost disease theory by introducing services consumption into utility function and human capital accumulation function. The model therefore proposes that there are only two sectors in economy, namely manufacturing sector and services sector. Economic growth is endogenous. Services do not simply enter the utility function, but they also enter the accumulation function of human capital, which is then used as an input in all sectors.

The services consumption untility function is then presented as

$$\text{Max } U_{t=0}=\int(\lambda \ln Q_s + (1-\lambda) \ln Q_m)\, e^{-\rho t}\, dt$$

subject to:

$L_m + L_s = L$

$h_t = \delta d Q_{st}$

$\text{Lim}\psi_t\, k_t\, L=0$

where

Q_m: output of manufacturing goods

Q_s: output of services

L_m: employment in manufacturing sector

L_s: employment in service sector

L: total employment in the economy

h_t: improvement of labour skill generated by the consumption of services, used as the measurement of human capital accumulation

ρ: rate of time preference , with the value above 0

λ: preference for services consumption, with the range of [0,1]

ψ_t: price of human capital in terms of present utility

d: share of services that is intentionally devoted to increasing human capital

δ: average efficiency of overall services in raising human capital

In particular, if d=0, then services are consumed without any investment purpose. To this extent, services consumption would affect future economic growth, only if $\lambda>0$.

Since services are produced by using part of the existing human capital stock, thus the human capital accumulation function is as follows:

$h_t=\delta dQ_{st}$

Hence, based on the Cobb-Douglas production function, the final economic growth equation is as follows:

$Q=\delta ade^{rt}(1-Ls,t) +\delta bd\ e^{rt}\ L_{s,t}$

where,

a: productivity in manufacturing sectors
b: productivity in services sectors
r: endogenous technical progress rate

Thus, the model shows that in the services sectors, the services production is particularly effective when the services contribute to human capital formation. Due to that, it would yield a permanent growth effect in both manufacturing and services sectors by rasing human capital accumulation. Therefore, Pugno (2006) argues that Baumol's pessimistic conclusion on the declining aggregate growth is thus alleviated and might be even reversed.

Clemes et al. (2002) investigate the contribution of services to economic growth in five Southeast Asian countries namely Indonesia, Malaysia, Philippines, Singapore, and Thailand during 1965-1994. The results show that the producer services, distribution services, and consumer services improve the efficiency of resource allocation and factor productivity, and play a significant role for economic growth in

these countries.

In the context of China, some empirical studies on the relationship between services and economic growth have been conducted at the national level. Most findings indicate a positive relationship between services and economic growth. For instances, Fan and Zhu (2002), Jiang and Li (2004), Li (2005), and Zhang et al. (2008) examine the importance of services on the overall economic growth. Their results show a significant positive correlation between the proportion of value-added services and GDP, thus indicating that services promote economic growth positively.

The panel data model has been widely used to analyze the relationship between services and regional economic growth in China (Li, 2004; Wei & Cao, 2008; Wang, 2009; Yao et al., 2011). Yao et al. (2011) use panel data of 1990-2008 for major cities in three economic deltas namely Yangtze River, Pearl River, and BohaiRim to analyze the effect of services on regional economy. They take urban services output value as an independent variable, and secondary industry output value, physical capital investment, FDI, and services agglomeration as four control variables. The OLS estimation results for fixed effect modle show that services have positive effects on the regional economy. Nevertheless, the study also reveals that excessive spatial agglomeration of services tends to inhibit the growth of regional economy by its negative externalities.

While some studies have ignored unit root tests that are subject to the spurious estimation problem (Granger & Eagle, 1987), some other studies have adopted the panel unit root and panel cointegration test to overcome the spurious estimations. For example, Yu (2008; 2010) establishes a spatial econometric model based on 30 provincial panel data from 1989 to 2005. He applies the panel unit root and cointegration tests, and finds the existence of long-run stable positive equilibrium relationship between services and economic growth.

Other than that, Pan (2010) uses regional panel data of Eastern, Central, and Western regions over the period from 1998 to 2008, and analyzes the relationship between modern services' agglomeration and the regional growth. He finds an obvious long-term cointegration relationship between modern services spatial agglomeration and regional economic growth in those regions.

Recently, Panel Error Correction Model (PECM) has been employed to examine the short-run equilibrium relationship between services and economic growth in China. Wang (2009), Zeng and Yuan (2010), Zheng (2010), and Yang et al. (2010), adopt the panel unit root tests, cointegration tests, and Error Correction Model to analyze the relationship between services and regional economic growth in Eastern, Central, and Western Regions of China. Wang (2012), Tian et al. (2013) examined the dynamic effect of services on regional economic growth in Eastern, Central, and Western Regions of China using the panel Contegration Model and Error Correction Model.

Through the OLS estimations, their findings indicate both short-run and long-run equilibrium relationships between services and economic growth in those regions.

In summary, despite the support on the positive relationship between services and economic growth in China, most of these studies have only focused on the national level, not urban level. Therefore, unlike the earlier studies, this present study explores and analyses the effect of urban services on regional economic growth in China.

2.8 Summary

Urban services play a prominent role in both urban and national economies. This chapter reviews related literatures on factors influencing services growth and the effect of services on regional economic growth. Most previous studies have highlighted the positive role of demand factors (such as per capita income, urbanization, division of labour) and supply factors (such as labour, physical capital, human capital) on services growth. However, few studies have included institutional environments factors and services spatial agglomeration into their analysis. In fact, as China is in its transition period, institutional factors (such as services marketization and services openness) have important influences on urban services growth. Furthermore, as the services are highly agglomerated in urban areas, their agglomeration has also influenced urban services growth. Therefore, this study aims to fill the gap by adding institutional factors and urban services spatial agglomeration

to examine how demand, supply, institutional environment, and spatial agglomeration would together influence the urban services growth.

Although previous studies have proven the positive role of services on regional economic growth in China, they have some of the following problems. First, their scope is mostly at macro national or regional level. Second, most empirical methods focus on the long-run relationship, neglecting a dynamic tests on short-run relationship between services and regional growth. Hence, this study extends previous research by focusing on both the short-run and long-run effects.

CHAPTER THREE

RESEARCH FRAMEWORK

This chapter discusses the theoretical framework and hypotheses development as presented in Figure 3.1.

3.1 Theoretical Framework

Factors influencing urban services growth

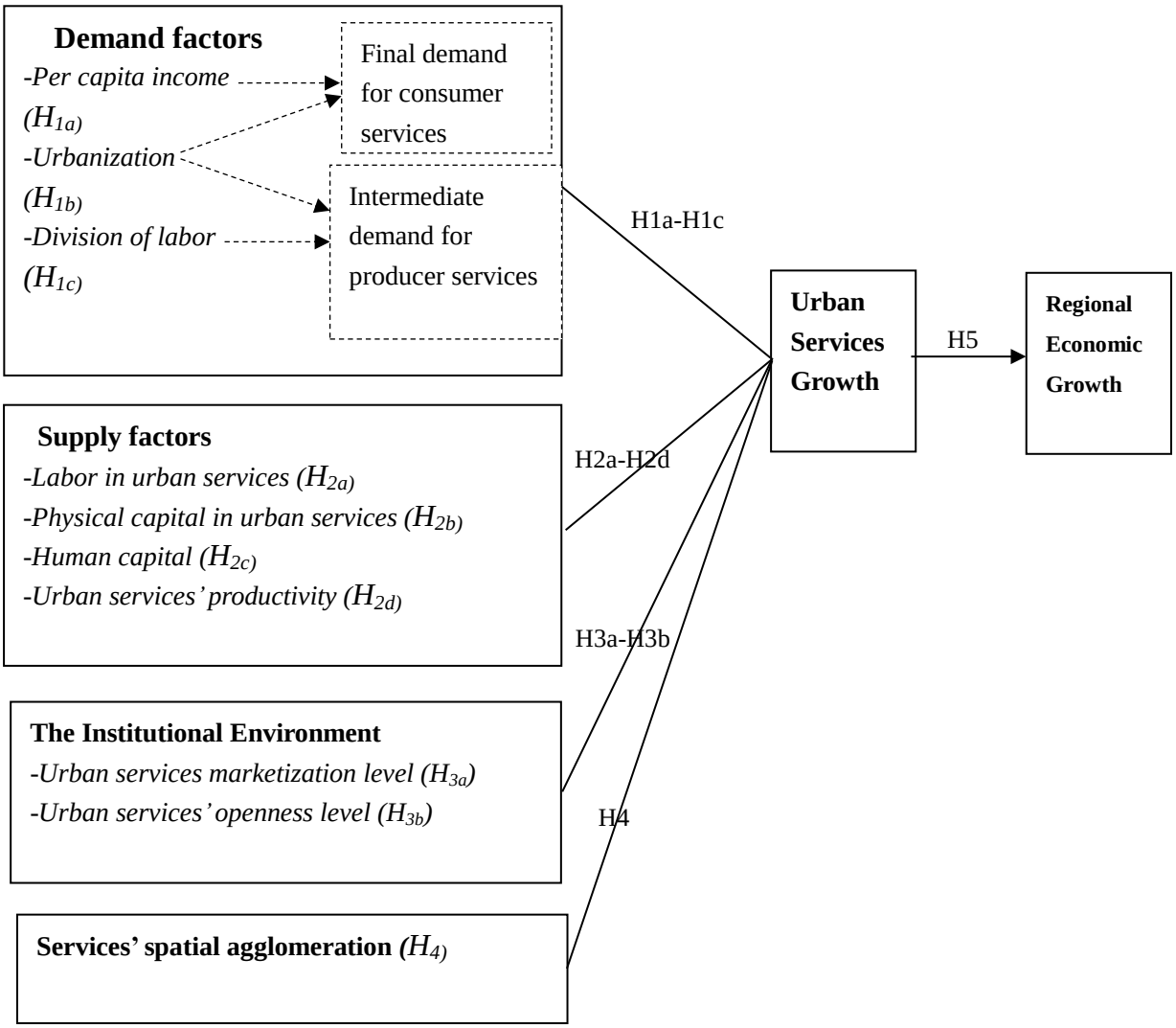


Figure 3.1
Theoretical Framework
Note:------ intermediate effect of demand factors on urban services growth
—— direct effect of influencing factors on urban services growth

The study identified four main factors that influenced urban services growth, namely demand, supply, institutional environment, and spatial agglomeration. From the demand side, per capita income would influence urban services growth through its effect on the final demand for consumer services (Li, 2004; Hu, 2008; Xie et al., 2009). Urbanization would influence urban services growth through its effect on both the final demand for consumer services and the intermediate demand for producer services (Guo, 2009; Chang, 2009; Zeng and Yuan, 2010), while, division of labour would influence urban services growth mainly through its effect on the intermediate demand for producer services (Gu, 2008; Bi, 2009; Hu, 2009; Cheng and Chen et al., 2010).

As for the supply factors, the inputs of labour and physical capital have been justified to be positively related to urban services growth (Gu, 2005; Li, 2008; Wei et al., 2009). In addition, human capital and services productivity are also critical in urban services growth as they could generate increasing returns effects on factors accumulation through the efficient utilization of producing factors (Hu, 2008; You, 2009).

Considering the institutional environment factors, services marketization provides an effective incentive to promote urban services growth through the efficient resources allocation mechanism (Hu, 2008). On the other hand, services openness level could promote urban services growth through market expansion, together with knowledge

and technological spillover effects (Wei, 2009; Hu et al, 2011).

The spatial agglomeration of services contributes towards urban services growth through improvement of labour productivity, based on the effect of increasing returns to scale (Hu, 2009; Tong et al., 2010; Guan 2012; Wang and Fan et al., 2013).

Finally, the development of urban services growth could promote regional economic growth by improving productivity, facilitating employment and human capital accumulation, as well as optimizing regional economic structure (Wang, 2009; Hu, 2009; Yao, 2011; Wang, 2012; Tian et al., 2013).

Therefore, the discussion of the theoretical framework forms the basis for the following hypotheses development.

3.2 Hypotheses Development

This study proposed 11 hypotheses related to research objectives (pg. 5), as outlined in Figure 3.1 (pg. 84) and summarized in Table 3.1.

Table 3.1

Research Hypotheses

Effects	**Influencing Factors**	**Hypotheses**
Urban services growth	***Demand:***	
	a: Per capita income (PI)	H1a: Per capita income influences urban services growth.
	b: urbanization (URBAN)	H1b: Urbanization influences urban services growth.
	c: division of labour (DIV)	H1c: Division of labour influences urban services growth.
Urban services growth	***Supply:***	
	a: labor (SL)	H2a: Labour input is related to urban services growth.
	b: physical capital (SK)	H2b: Physical capital investment is related to urban services growth.
	c: human capital (HUM)	H2c: Human capital is related to urban services growth.
	d:services productivity (SP)	H2d: Services productivity is related to urban services growth.
Urban services growth	***Institutional Enviroement:***	
	a: services marketization (MARK)	H3a: Urban services growth is influenced by services marketization.
	b: services openness (OPEN)	H3b: Urban services growth is influenced by services openness.
Urban services growth	***Spatial Agglomeration:***	
	urban services agglomeration (USAG)	H4: Urban services growth is influenced by services agglomeration.
Regional growth	***Urban services growth*** (URBS)	H5: Urban services growth contributes to regional economic growth.

H1a until H1c focus on the effects of demand factors on urban services growth (per capita income, urbanization, division of labour). H2a until H2d emphasize on the effects of supply factors on urban services growth (labour, physical capital, human capital, and services productivity). H3a until H3b relate the effects of institutional environment factors on urban services growth (services marketization and openness

level). H4 tests the effect of services agglomeration on urban services growth, and H5 measures the relationship between urban services and regional economic growth. The following sections further discuss the development of these hypotheses respectively.

3.2.1 Demand Factors and Urban Services Growth

This study identified 3 elements as the main demand factors influencing urban services growth in China, namely per capita income, urbanization, and division of labour.

a. Per Capita Income

According to Engel's law (1857, cited in Hu, 2008) and Maslow's Hierarchy of Needs Theory (1943, cited in Hu, 2008), people's needs are hierarchical, and increase with income level. Specifically, people tend to shift towards superior demand for self-enjoyment and self-improvement products only when their low-level demand for survival necessities such as foods, clothes, house, and other material products have been met. Services, especially consumer services such as tourism, entertainments, catering, and healthcare could satisfy superior needs than physical goods, and per capita income would directly influence people's final demand for consumer services, as the demands for consumer services are of high income elasticity (Hu, 2008; Xie, 2009). As the per capita income increases, a greater share of income could be devoted to the purchase of consumer services for self-enjoyment

and development. Those with high disposable income will increase their final consumption on consumer services, while people with low disposable income will spend less on certain services as they need money for other survival necessities.

Li (2004), Ni (2004), and Hu et al. (2008) note a positive relationship between per capita income and the growth of output value in urban services in China. This income-induced demand for services would propel urban services production, thus contributing to urban services output growth (Xie, 2009). Therefore, the first hypothesis is as follows:

H1a: Per capita income influences urban services growth.

b. Urbanization

Urbanization is closely related to urban services growth in two ways. First, urbanization naturally leads to population concentration, and subsequently generates a huge final demand for consumer and public services (such as retail services, hotel and catering services, entertainments, education, and healthcare). In fact, population size determines the potential market size for services consumption. In addition, the simultaneity and the nonstorage properties of services products determine the majority of production, and consumption activities are carried out in their original place. Hence, the original market's demand becomes the primary influencing factors of services growth (Hu, 2010). In other words, high urbanization level implies a high concentration of population and great local market demand for service products, thus

contributing towards the urban services growth.

Second, urbanization usually attracts industrial agglomeration, accompanied by concentration of physical capital, human capital, and information and technology in urban areas. The expanding producing activities naturally increase intermediate demand for producer services such as finance, accounting, R&D, management, and marketing. Frequently, services require a face-to-face contact, making service companies to spend some of their resources on transportation. The perfect transportation system and people concentration in urban can provide superior facilities and save transportation costs (Hu, 2008; Guo, 2009).The high level of urbanization tends to lower the costs for supplying services, leading towards stronger demand for services, thus there will be positive effect on urban services growth. This situation leads to our second hypothesis:

H1b: Urbanization influences urban services growth.

c. Division of Labour

Division of labour refers to the division, specialization and independence of economic activities, or the specialization of the economy (Hu, 2009). It could promote urban services growth in two ways. First, the deepening division of labour between services and other industries as well as within services sectors could promote technical progress and skill enhancement, thus improving the services productivity. Improvement in productivity would further accelerate services growth

through the increasing returns effect (Yang, 1999). Second, and more importantly, the great intermediate demand for producer services brought by division of labour in manufacturing industry provides pulling force for its growth.

In the context of China, industrial division of labour mainly refers to division of labour in secondary industry. It is because, under the economic industrialization strategy since 1980s, the secondary industry has been experiencing rapid growth, thus has become leading forces in both national and urban economies. The deepening division of labour within secondary industry (especially manufacturing sectors) generates greater intermediate demand for producer services, hence promoting the growth of producer services (Hu, 2009; Cheng et al., 2010). The mechanism is explained in Figure 3.2.

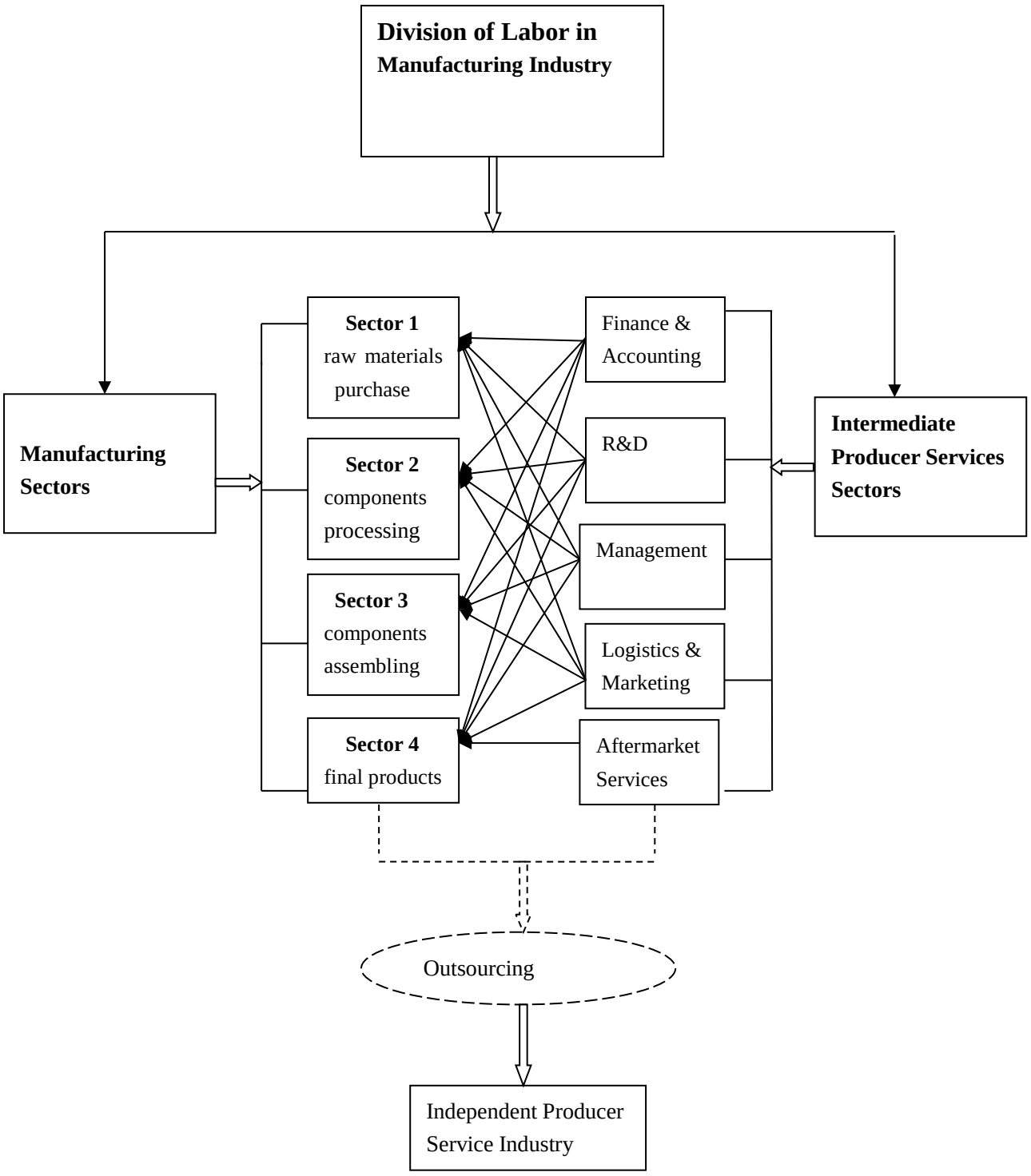


Figure 3.2

Division of Labor in Manufacturing Industry and Services Growth

Source: Adopted and Modified from Chen, K. (2009). *Research on the Upgrading of Inner Structure of Service Sector in China.* Beijing: Economic Science Press.

As shown in Figure 3.2, the producing chains are prolonged by many independent intermediate manufacturing sectors (e.g., raw material purchase sector, component processing sector, component assembling sector, final products sector) and producer services sectors (e.g., finance and accounting, R&D, management, logistics and marketing, and aftermarket services). The function of producer services sectors is to provide intermediate service inputs for manufacturing sectors.

Although division of labour promotes the establishment of so many producer services sectors within manufacturing enterprises, the enterprises' intermediate transaction costs are increased accordingly. Therefore, in order to focus on their core manufacturing competitiveness and to decrease intermediate costs, many producer services are separated out from inner manufacturing enterprises, and outsourced or externalized to the specialized services companies, thus promoting services outsourcing activities (Chen, 2009). As a result, producer services begin to develop independently (Chen, 2009). Therefore, the third hypothesis is as follows:

H1c: Division of labour influences urban services growth.

3.2.2 Supply Factors and Urban Services Growth

This study identified 4 supply factors that could influence or determine the total output of urban services in China, namely labour, physical capital, human capital, and services productivity (Hu, 2008; Cen, 2009; Wei et al., 2010).

a. Labour

The number of labour in urban services is critical to its growth. The higher ratio of urban services labour participation rate, measured by the proportion of labor in urban services to total urban population, indicates the more labors involved in urban services, and the more conducive to urban services growth (Hu, 2008; Wei, 2010).

It is recognized that the number of labour supply in urban services would not only impact urban services output, but also its internal structure. The urban places with abundant labour resources and low labour cost would have advantages in the labour-intensive services. On the other hand, urban places with a large supply of highly skilled labour would gain advantages in the knowledge and technology-intensive producer services (Chen, 2009). Hence, the hypothesis says as follows:

H2a: Labour input is related to urban services growth.

b. Physical Capital

The neo classical economic theory (Solow, 1956) emphasizes the importance of physical capital in promoting output growth. Thus, the amount of physical capital in urban services is directly related to its outputs, especially for the high capital-intensive producer services such as finance, insurance, IT, accounting, consulting, and R&D services. Wei and Hu (2008) conclude that the amount of physical capital investment in urban services, measured by domestic fixed assets

investment, varies greatly among cities in China. For instance, the urban services output is high in developed Eastern region that has registered high domestic fixed assets investment. However, the underdeveloped Western China suffers the lowest urban services output due to inadequate fixed assets insert. Thus, the hypothesis is read as follows:

H2b: Physical capital investment is related to urban services growth.

c. Human Capital

Human capital refers to the stock of competences, knowledge, and personality attributes embodied in labour to produce economic value. It is the attributes gained by a worker through education and experience. Therefore, it is different from physical factors such as land, labour, or physical capital (fixed assets and monetary capital).

The endogenous growth theory (Romer, 1986; Lucas, 1988), emphasizes the role of human capital in technological progress and industrial growth. With the wide spread of information and communication technology in urban production system, services (especially producer services) such as financial services, business services, R&D services, design services, and IT services increasingly depend on information technology. Consequently, human capital with professional knowledge and skills is the key element for producer services growth in urban places. Furthermore, human capital in urban services can also contribute to accumulation of physical capital

through increasing returns, which further promote urban services growth (Hu, 2008). As urban services require direct face-to-face contact between producers and consumers, the quality of services employees would enhance the output quality and efficiency of urban services (Zhang et al., 2011). To conclude:

H2c: Human capital is related to urban services growth.

d. Services Productivity

Urban services productivity reflects resources allocation efficiency in urban services. The same amount of labour and capital inputs with different factor allocation efficiency within urban services lead to different output of urban services (Hu, 2008). The higher urban services comparative productivity implies the higher input-output ratio of factor allocation in urban services (Chen, 2009). If labour, physical capital, and human capital are reallocated from other low-productivity services sectors to high -productivity services sectors, the whole productivity and output in urban services could be improved because of the fully utilization of producing factors. Therefore, the hypothesis is:

H2d: Services productivity is related to urban services growth.

3.2.3 Institutional Environments and Urban Services Growth

This study identified two main institutional environment factors that influence urban services growth in China, namely services marketization and services openness.

a. Services Marketization

Marketization provides an effective incentive and mechanism for resources allocation in urban services that could promote services growth (Hu, 2008). The improvement in services marketization level promotes the process of services separation, externalization, and outsourcing from manufacturing enterprises to outside market, and then develops into an independent industry through market mechanism (Chen, 2009).

Second, services marketization could accelerate the growth of nonstate-owned services and break the state monopoly, thus help to improve services productivity and structure (Fan, 2008). Great government intervention in urban services market activities would reduce the role of market mechanisms in resource allocation (Chen, 2009; Hu and Ma et al. 2012). In fact, if government participates too much in urban services, it is easier to bring rent-seeking and corruption activities, resulting in nonproductive consumption of large amounts of resources and increasing transaction costs of services that would hinder the growth of urban services (Wang, 2008; Yan and Wang et al., 2013).

Urban services with a high marketization level (e.g., with a perfect financial and commercial market) would benefit urban services to gain adequate capital for their growth. In addition, the formation of market transaction order and equal market competition environment in urban services can attract the inflows of foreign capital

that is conducive to urban services growth (Hu, 2008; Hu and Ma et al., 2012). Hence, the hypothesis is as follows:

H3a: Urban services growth is influenced by services marketization.

b. Services Openness

Urban services openness refers to its degree to international market, which involves activities of international trade, international investment, and technological transfers on services. Urban services openness to international market has a positive effect on its growth. First, services opening-up through international trade, international finance, and foreign direct investment (FDI) would enlarge the market expansion effect. This will further deepen division of labour and specialization, and improve productivity in urban services, thereby contributing to urban services growth. Second, the knowledge and technology spillovers effects through international trade and foreign direct investment are conducive to promote technological progress and productivity improvement, thus contributing to urban services growth. Third, urban services openness helps develop a competitive environment that encourages domestic services enterprises to innovate in order to improve services quality and productivity, and to improve the competitiveness of urban services. In addition, the FDI in urban services are able to accelerate capital accumulation in host country, and effectively integrate various resources, which play an active role in promoting urban services' growth, such as broader market channels, advanced management, and core technology (Hu et al., 2011). Services openness would further improve services

marketization level that is beneficial to urban services growth. Thus, the hypothesis is as follows:

H3b: Urban services growth is influenced by services openness.

3.2.4 Services Agglomeration and Urban Services Growth

Services spatial agglomeration in urban would bring positive increasing returns to scale effects, thus further attract labour and capital accumulation in urban services. As a result, resources supply in urban services is strengthened, while the efficiency of resources allocation is also improved through the agglomeration effect. This continuous self-strengthened process is conducive to form a positive feedback mechanism for the rapid growth of urban services.

Furthermore, the increasing returns to scale effect by services agglomeration would attract large amount inflows of skilled human resources and market-related information, thus reducing service enterprises' costs for searching human resources and market information, which are conducive to enhance urban services output efficiency (Hu and Wei, 2009; Guan, 2012; Wang and Fan et al., 2013). Thus, the hypothesis is as follows:

H4: Urban services growth is influenced by services agglomeration.

3.2.5 Urban Services and Regional Economic Growth

Many studies have concluded that a high proportion of fast-growing services in a

particular region could contribute to rapid growth of the regional economy through backward and forward linkages (Pugno, 2006; Engelbrecht, 2006; Wang, 2009; Yang and Li et al., 2010).

The importance of urban services on regional economic growth could be summarized as follows. First, urban services growth could promote regional growth by improving productivity. Specifically, the rapid growth of intermediate producer services could decrease transaction costs by providing specialized and efficient services in producing chains. This is beneficial to improve productivity and economic growth.

Second, urban services growth could absorb labour and accelerate human capital accumulation. Some traditional labour-intensive services sectors have a high potential to absorb labour and promote social employment. On the other hand, the knowledge and capital-intensive producer services sectors could facilitate physical capital, human capital, and knowledge accumulation, thereby generating increasing returns effect to promote regional growth.

Third, the essence of modern economic growth is the upgrade of industrial structure towards services, reflecting the efficient utilization of resources. As urban places are natural carriers for services growth as well as the heart of regional economy, urban services growth is an important impetus for regional economic growth through the optimization of regional economic structure effect (Yu, 2011; Wang et al., 2012).

Therefore, the hypothesis is as follows:

H5: Urban services growth contributes to regional economic growth.

3.3 Summary

This study identified four main factors influencing the urban services growth in China. Based on these factors, 10 hypotheses were developed to identify factors influencing urban services. Furthermore, another hypothesis was developed to especially examine the effect of urban services on regional growth in China. The corresponding chapter presents the methods used in this study.

CHAPTER FOUR

DATA AND RESEARCH METHODOLOGY

The present study has two main objectives. The first objective is to determine the relationships between influencing factors and urban services growth, and secondly, is to investigate the effect of urban services on regional economic growth in China. This chapter is divided into three subsections, (1) specifications of data and variables, (2) the multiple regression analysis to examine influencing factors of urban services growth, and (3) the panel data model to measure the effect of urban services on regional economic growth.

4.1 Data and Measurement of Variables

This study chose two different time periods for analysis. First, the five years data of 2006-2010 were used to analyze the effect of influencing factors on urban services growth based on 286 cities of 30 provinces (excluding Tibet).This period represented "The Elventh Year Plan", in which urban services experienced rapid growth and the availability data for services marketization and openness level. Secondly, the analysis on 2001-2010 periods were used to estimate the effect of urban services on regional economic growth, whereas, these cities were further grouped into three regions (Eastern, Central, and Western) to evaluate both short-run and long-run effects of urban services on regional growth.

The secondary data for urban services growth and its influencing factors were gathered from various China Urban Yearbooks (China$_{4,}$ 2007-2011), while the China Statistical Yearbook (China$_{5,}$ 2002-2011) provided data for regional economic growth and their related variables.The analysis was conducted using the packages of STATA 12.0 and Eviews 6.0.

4.1.1 Measurement of Dependent Variables

Dependent variables were categorized as urban services growth and regional economic growth.

1) Urban Services Growth

Urban services growth can be measured either by services gross output value, output growth rate, or per capita output value (You, 2008). However, due to data avaialibity, this study adopted the total output value of urban services as a proxy for their growth level, as had been adopted by Huang (2009), Hu (2011), Guan (2012) and Wang et al. (2013). The values were then transformed into logarithm to avoid the heteroscedasticity (Hu, 2011; Guan, 2012; Wang et al., 2013).

2) Regional Economic Growth

Regional economic growth is the dependent variable for panel data analysis. It refers to the gross domestic output in a specific region at specific period (usually 1 year) and measured by regional GDP (Pan, 2010; Yao, 2011; Wang, 2012; Tian et al.,

2013). The logarithm values were used to avoid the heteroscedasticity problem.

4.1.2 Measurement of Independent Variables

The study identified 10 independent variables namely per capita income (PI), urbanization (URBAN), division of labour (DIV), labour in urban services (SL), physical capital in urban services (SK), human capital (HUM), services productivity (SP), services marketization (MARK), services openness level (OPEN), and services spatial agglomeration (USAG). These independent variables are specified as follows:

1) Per capital income

Per capita income refers to urban resident's average income level, and is measured by dividing urban resident's total income to urban total population using the following equation (Hu, 2008; Xie et al., 2009):

$PI_{urban} = TI_{urban} / TP_{urban}$

where,

PI_{urban}: per capita income of urban resident
TI_{urban}: total income of urban resident
TP_{urban}: urban total population

2) Urbanization

Urbanization is defined as the process of rural population agglomeration to urban (Henderson, 2004; Gao, 2006; Guo, 2009; Hu et al., 2010). It is measured based on the proportion of nonagricultural population to total urban population using the following equation (Hu et al., 2010):

Urban =V/N

where,

Urban: urbanization level
V: the number of nonagricultural population in urban
N: the number of total population in urban

This index ranges from 0 to 1; the larger value indicates a higher urbanization level.

3) Division of Labour

The measurement of division of labour is particularly confined to secondary industry. It is because under the long-term industrialization development strategy in China, secondary industry has been matured with a complete division of labour system. Its average contribution ratio to national GDP has reached 70 percent, much higher than the primary and services industries (Fan, 2007; 2011). The division of labour in urban secondary industry is the main demand force for urban producer services (Cheng & Chen, 2010). Therefore, it is reasonable to choose division of labour in secondary industry as a representative proxy (Cheng & Chen, 2010).

Basing on Hoover specialization equation, this study adopted the method by Fan (2007) to calculate the degree of labour division in each specific city, with the following equation (Hoover & Giarratani, 1984; Fan, 2007; Liang et al., 2011):

$$DIVi = 1/2\left|E_i^m / \sum E_i^k - E_n^m / \sum E_n^k\right|$$

where,

i: urban i
m: the manufactury industry

k: the secondary industry
E_i^m: the employment in manufactury industry in urban i
$\sum E_i^k$: the total employment in secondary industry in urban i
E_n^m: the total national employment in manufactury industry
$\sum E_n^k$: the total national employment in secondary industry

The value should range between 0 and 1. The higher value indicates the more deepening degree of division of labour in urban secondary industry.

4) Labour in Urban Services

Labour in urban services represents the amount of labour input, and is measured by the number of employees in urban services.

5) Physical Capital Investment

In order to avoid the overlapping calculation of FDI in urban services that measures services openness, physical capital investment refers to the amount of domestic fixed assets formation in urban services, measuring the input of physical capital in urban services.

6) Human Capital

Normally, human capital is measured using education indicators. For instance, Romer (1990) uses the literacy rate as the measurement of human capital; Mankiw and Weil (1992) take the proportion of adults enrolment in middle school; and Hu (2008), Wei (2010), and Zhang et al. (2011) define the labour with higher education of 16 years schooling as human capital.

As there is no official statistics for employees' education year in urban services, this study used the stock of urban i's university students per ten thousand people as a proxy for the potential human capital supply for urban services (Hu, 2008; Wei et al., 2010). In other words, the higher stock of university students is in the urban i, the higher is the potential capacity of the human capital supply in urban i's services.

7) Services Productivity

The study used urban services' comparative labour productivity as a direct measurement of factor allocation efficiency in urban services, based on Chen (2009) and Yang and Su (2009). Services productivity is presented by the ratio of the proportion of services' added output value in urban GDP to the proportion of added labour of urban services to total urban labour. The indicator implies for every one percent increase in the proportion of labour input in urban services, i.e., how much the proportion of urban services output value would increase. The equation is as follow (Chen, 2009):

$SP_i = (\Delta URBS_i/GDP_i)/(\Delta SL_i/TL_i)$

where,

SP_i: urban services' comparative labour productivity in urban i
$\Delta URBS_i$: urban services' added output value in urban i
GDP_i: GDP of urban i
ΔSL_i: added labour in urban i's services
TL_i: total labour in urban i

The higher value indicates the higher services' productivity and higher factor allocation efficiency in urban services.

8) Services Marketization

The widely accepted measurement of Marketization level in China is the Marketization Index in NERI Year Report (Fan &Wang, 2011). However, this index only calculates the marketization level at provincial level, without specific index at urban level.

On the other hand, the China City Commercial Credit Environment Index (CEI, $China_6$) by Chinese Commercial Credit Research Centre reports the marketization level of commercial credit service sectors in cities at prefectural level, which could reflect the marketization level of urban services to a certain extent that is suitable as a proxy for urban services marketization level in this study.

The CEI is a comprehensive index, composing of seven first-level indicators and sixteen subindicators, ranging from 0 to 100. The higher index value implies the higher marketization level of commercial services, thus indicating the higher marketization level of urban services.

9) Services Openness

FDI in urban services is considered as associated activities involving international trade, capital movement, and technological transfers on services. Thus, FDI in urban services has a comprehensive influence on services openness level (Lin & Liu, 2004; Hu et al., 2009). Therefore, foreign direct investment in urban services is usually

adopted as an indicator of services openness level (Yin, 2006; Huang, 2009; Hu et al., 2011). Following their method, the present study used the actual utilization amount of urban services' FDI as a proxy of its openness level.

10) Services Agglomeration

The location quotient (LQ) is an index comparing the proportion of a particular industry within the local economy to the proportion of the same industry within a larger economy (Miller, 1998; Grimes et al., 2007).

In this study, urban services' LQ is taken as a measurement of its spatial concentration level. The formula, as shown below, is the ratio of per capita urban services output to the national per capita services output (Hu & Wei, 2009; Chen & Zhang, 2011; Gao et al., 2011)

$USAG_i = (SER_i/SER)/(GDP_i/GDP) = (SER_i/GDP_i)/(SER/GDP)$

where,

$USAG_i$: urban services spatial agglomeration of urban i
SER_i: services' output of urban i
SER: national output of services
GDP_i: GDP of urban i
GDP: the total national GDP

The services' agglomeration level increases as the value of the index increases, indicating a higher agglomeration level of urban services in that region.

4.1.3 Dummy and Control Variables

In this study, the hierarchical multiple regression analysis was based on 286 cities,

involving a 5-years period. While the number of time series (5 years) is less than the number of cross section items (286 cities), thus for this type of data, we should focus on the cross section items instead of time series (Gao, 2012; Zhang et al., 2012). Hence, a pooled regression approach was appropriate, since it equals to the cross section regression estimations (Zhang et al., 2012).

The study grouped the 286 sample cities into Eastern, Central, and Western regions. Since the Western cities were most lagged compared to Eastern and Central regions, therefore, as had been carried out by Pan (2010), Chen (2011), Zhang (2012), and Wang et al. (2012), the Western region would be used as a base dummy for comparision in this study.

1. $Area_1$ = 1 if eastern cities, otherwise 0;
2. $Area_2$ = 1 if central cities, otherwise 0.

In panel data model, four control variables were included, as they were considered other critical factors for regional economic growth, thus it was necessary to control their impacts (Zeng, 2008; Hu, 2011; Yao, 2011). These control variables were as follows: regional secondary industry (RIND), regional physical capital investment (RINV), regional openness level (RFDI), and regional urban services' agglomeration (RUSAG). Table 4.1 provides this summary:

Table 4.1

Variables for Analysis

Variables	Acronym	Measurement
Dependent		
Urban services growth	URBS	urban services output value
Regional economic growth	RGDP	regional GDP of region i
Independent		
Per capita income	PI	ratio of urban total income to urban total population
Urbanization	URBAN	the ratio of urban non-agriculture population to urban total population
Division of labor	DIV	calculated based on Hoover Division Equation
Labor input	SL	employees in urban services
Physical capital input	SK	physical assets investment in urban services
Human capital	HUM	urban university students per ten thousand people
Service productivity	SP	urban services' comparative labor productivity
Services Marketization level	MARK	urban Commercial Credit Environment Index (CEI)
Services openness level	OPEN	the amount of FDI in urban services
Urban services' agglomeration	USAG	urban services' location quotient index
Dummy Variables		
$Area_i(i=1,2)$	$Area_1$	$Area_1$=1 if eastern cities; otherwise 0
	$Area_2$	$Area_2$ =1if central cities; otherwise 0
Control Variables		
Regional secondary industry	RIND	urban secondary industry's output value in region i
Regional physical investment	RINV	urban physical capital investment in region i
Regional openness level	RFDI	the amount of urban FDI in region i
Regional service agglomeration	RUSAG	urban services' location quotient in region i

4.2 Research Models and Data Analysis

Based on research hypotheses and framework in Chapter Three, the following sections describe the research models and techniques for data analysis.

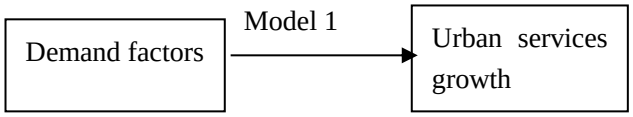
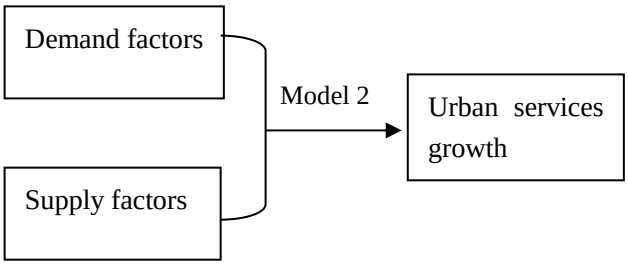
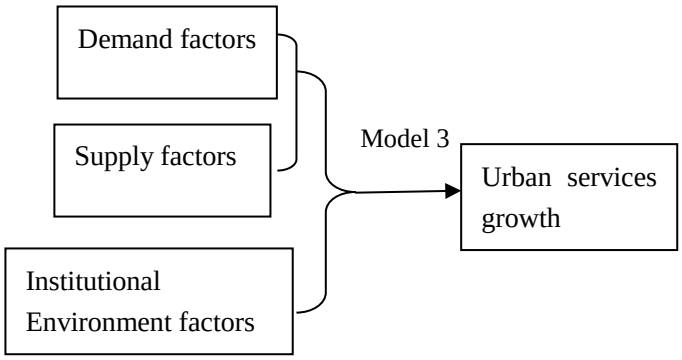
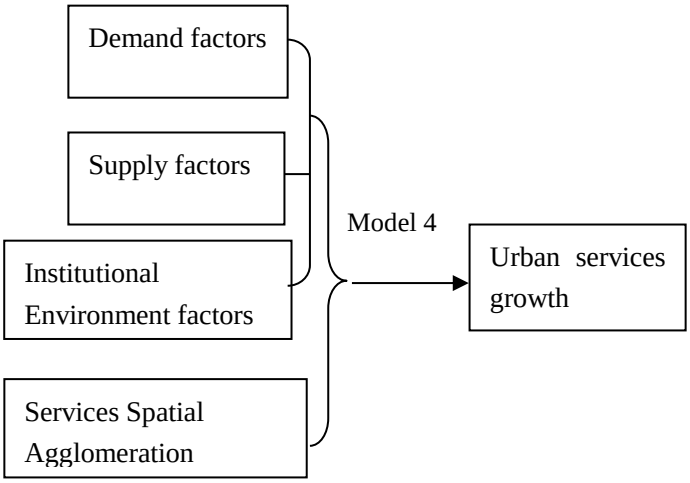
4.2.1 Hierarchical Multiple Regression Models

Multiple regression model estimates the partial marginal effects of independent variables on the dependent variable by minimizing the sum of squared errors to examine the effects of influencing factors on urban services growth in China (Jiang, 2004; Hu, 2008; Wu et al., 2010). If the classical linear assumptions are not violated, these estimated partial marginal effects can be proven to be Best Linear Unbiased Estimator (BLUE) (Rebecca, 2008).

However, this study used hierarchical regression estimation to compute the significance and influence of each set of factors on urban services growth. The influence could be measured by assessing the value of R-square change when each set of variables was added into the model (Hair et al., 2006). Specifically, in this study, four steps of hierarchical regression were used to compute the significance of the four main factors namely demand, supply, institutional environment, and services spatial agglomeration on urban services growth, respectively. The procedures were summarized in Table 4.2.

Table 4.2

Hierarchical Steps in Multiple Regression

Step		Hypotheses
1		H1a until H1c
2		H2a until H2d
3		H3a until H3b
4		H4

Step 1: Model 1 for H1a until H1c

The first step was to assess the effect of demand factors on urban services growth using Model 1:

Model 1

$$LnURBS = \alpha_0 + \beta_1 lnPI + \beta_2 URBAN + \beta_3 DIV + \beta_4 Area_i + \varepsilon \qquad (4.1)$$

where,

LnURBS: the natural logarithm of urban service growth
LnPI: the natural logarithm of per capital income
URBAN: urbanization level
DIV: division of labour
$Area_i$: dummy variable, $Area_1$=1 if Eastern cities, otherwise 0; $Area_2$ =1 if Central cities, otherwise 0
ε: the random error term

In step 1, H1a until H1c were assessed through the adjusted R^2. Model 1 provides the estimated proportion of variance in urban services growth that was predicted from demand factors. In addition, to assess the statistical contributions of these three demand factors, the study looked at their *t*-ratio associated with the corresponding slope coefficients (b_i). If the *t*-ratio was significant, it implied that the variable contributed significantly to urban services growth.

Step 2: **Model 2 for H2a until H2d**

Model 2 keeps demand factors constant, while inserting the supply factors of labour (SL), domestic physical capital (SK), human capital (HUM), and urban services productivity (SP) as new variables. Thus, demand, supply, and dummy variables were regressed together on urban services growth (URBS):

Model 2

$$LnURBS = \alpha_0 + \beta_1 LnPI + \beta_2 URBAN + \beta_3 DIV + \beta_4 LnSL + \beta_5 LnSK + \beta_6 LnHUM_i + \beta_7 SP + \beta_8 Area_i + \varepsilon \quad (4.2)$$

where,

LnSL: the natural log value of labours in urban services
LnSK: the natural log value of domestic physical capital in urban services
LnHUM: the natural log value of urban human capital
SP: urban services' comparative productivity

In step 2, the estimated proportion of variance in urban services growth as predicted from supply factors (H2a until H2d) was assessed through the R^2 change. Their contributions were estimated by corresponding slope coefficients (b_i) and associated *t*-ratios. If the *t*-ratio was significant, it implied that the variable contributed significantly to urban services growth.

Step 3: **Model 3 for H3a until H3b**

Model 3 keeps both demand and supply factors constant, while adding institutional environment factors of services marketization (MARK) and openness level (OPEN) as new variables. See section 3.2.3. Hence, the formula is as follows:

Model 3

$$LnURBS = \alpha_0 + \beta_1 LnPI + \beta_2 URBAN + \beta_3 DIV + \beta_4 LnSL + \beta_5 LnSK + \beta_6 LnHUM + \beta_7 SP + \beta_8 MARK + \beta_9 lnOPEN + \beta_{10} Area_i + \varepsilon \quad (4.3)$$

where,

MARK: urban services marketization level
LnOPEN: natural log value of the amount of urban services FDI

Similarly, H3a until H3b were evaluated through the R^2 change in Model 3, which provided the estimated proportion of variance in urban services growth predicted from institutional environment factors. The contributions of these two institutional factors were estimated by their corresponding slope coefficients (b_i) and associated *t*-ratios. A significant *t*-ratio implied variable contributed significantly to urban services growth.

Step 4: Model 4 for H4

Model 4 adds urban services spatial agglomeration (USAG) as new variable, while keeping demand, supply, and institutional environment factors constant. Finally, the demand, supply, institutional environment, and dummy variables were regressed together on urban services growth (URBS) using the following equation:

Model 4

$$\text{LnURBS} = \alpha_0 + \beta_1\text{LnPI} + \beta_2\text{URBAN} + \beta_3\text{DIV} + \beta_4\text{LnSL} + \beta_5\text{LnSK} + \beta_6\text{LnHUM} + \beta_7\text{SP} + \beta_8\text{MARK} + \beta_9\text{LnOPEN} + \beta_{10}\text{USAG} + \beta_{11}\text{Area}_i + \varepsilon \quad (4.4)$$

where,

USAG: urban services' spatial agglomeration, measured by location quotient index

The estimated proportion of variance in urban services growth, predicted from services spatial agglomeration (H4), was then evaluated through the R^2 change. To assess the contributions of services agglomeration, the study looked to the slope coefficients (b_i) and the associated *t*-ratio. If the *t*-ratio was significant, it implied that services agglomeration contributed significantly to the variance in urban services growth.

4.2.2 Panel Data Model

The most significant advantage of panel data model is that it contains both cross-section and time series factors that could better study the dynamics of economic growth as well as to identify its dynamic effects, which are not detectable in normal cross-section or time-series data (Hsiao, 2008). The study used panel data to test the effect of urban services on regional economic growth to fulfill H5. The basic unrestricted panel data equation is expressed in Model 5:

Model 5

$$LnRGDP_{it} = a_{it} + \beta_{1it}LnRURBS_{it} + \beta_{2it}LnRIND_{it} + \beta_{3it}LnRINV_{it} + \beta_{4it}LnRFDI_{it} + \beta_{5it}RUSAG_{it} + \xi_{it} \quad (4.5)$$

where,

α_{it}: intercept coefficients that vary across individual (city) i and time t
β_{it}: slope parameters that vary across individual (city) i and time t
ξ_{it}: the error term
i: Eastern, Central, and Western regions
t: the number of time
$RGDP_i$: economic growth level of region i
$RURBS_i$: urban services output value of region i
$RIND_i$: urban secondary industry's output value in region i
$RINV_i$: urban domestic physical capital investment in region i
$RFDI_i$: openness level of region i, which is the value of urban FDI in region i
$RUSAG_i$: urban services' agglomeration of region i, which is the regional urban services' location quotient
(Note: RGDP, RURBS, RIND, RINV, and RFDI are converted into the natural logarithm value to eliminate heteroscedasticity).

The four estimation procedures for panel data model are given in Table 4.3, and Appendix D provides these procedures in detail.

Table 4.3

The Estimation Procedures for Panel Data

Step	Estimation Techniques	Objective
1	Panel unit root tests using the LLC, the IPS,the ADF-F and PP-Fisher tests	Ensure data stationary
2	Pedroni tests for cointegration analysis	Long-run cointegration relationship
3	Chow and Hausman tests for the option between Pooled, Fixed Effect and Random Effect Model	Cointegration estimation
4	Error Correction Model	Short-run estimation

First, in dealing with time series data, the issues of stationary are critical, as estimating non stationary series may lead to spurious regression and invalid results (Wooldridge, 2006). In order to avoid the problems of spurious regression, the panel data need to be tested for the presence of unit roots. Hence, in this study, panel unit root test was first conducted to ensure data stationary using four unit root tests namely (1) Levin test, (2) Lin and Chu test (LLC), (3) Im, Pesaran and Shin test (IPS), and (4) ADF-F and PP-Fisher tests.

Second, the primary focus of this study was to investigate the long-run effects of urban services on regional economic growth. Thus, cointegration method was employed in order to detect for the presence of long-run cointegration equilibrium. The Pedroni (2004) cointegration tests were used to examine the long-run relationship between urban services and regional economic growth. Two types of statistics were used. First, four within-group statistics namely Panel V-statistic, Panel P-statistic, Panel PP-statistic, and Panel ADF-statistic. Second, three between-group

statistics namely Group P-statistic, Group PP-statistic and Group ADF-statistic.

Third, basing on the confirmation of cointegration relationship, it was necessary to select specific type of panel data model to build a long-run equilibrium equation for estimations. According to the assumptions on parameters (regression slope coefficients and regression intercepts), there were different types of panel data model that would affect the formulation and estimation results. Thus, the Chow and Hausman tests were run respectively to select the model that should be used for estimation.

Fourth, the cointegrating regression considers only the long-run property of the model, and does not deal with the short-run dynamics explicitly. However, a good time series model should describe both short-run dynamics and long-run equilibrium simultaneously. According to Granger Representation Theorem (Granger, 1987), two or more time series that are cointegrated would have an error correction representation (Engle & Granger, 1987). Therefore, it was necessary for this study to adopt error correction model (ECM) to provide a dynamic estimation on the short run effects of urban services on regional economic growth in China.

4.3 Summary

This study identified 5 models and developed 11 hypotheses in order to fulfill the research objectives and research questions as listed in section 1.2 and 1.3 in Chapter

One. The hierarchical multiple regression models (Model 1 until Model 4) were designed to examine the effects of influencing factors on urban services growth, and the panel data model (Model 5) was developed to examine the contribution of urban services towards regional economic growth. The findings are presented in the following chapter.

CHAPTER FIVE

RESEARCH FINDINGS

This chapter presents the research findings. Section 5.1 presents hierarchical multiple regression results of Model 1 until 4 to evaluate the influencing factors for urban services growth in China. Section 5.2 provides analysis of panel data model that examined the effect of urban services on regional economic growth. Figure 5.1 summarizes this chapter.

5.1 The Hierarchical Regression Analysis

The effects of various factors on urban services growth and research questions 1 until 4 were examined through Model 1 until 4, respectively. These factors are described based on: descriptive analysis and the hierarchical multiple regression estimations.

5.1.1 Descriptive Analysis of Variables

In order to view the real characteristics of variables, data for descriptive analysis were actual values before transformation. As the samples were 286 cities in China with 5-year period (2006-2010), the related variables were pool data (combined for all the five years) with a total 1,430 observations (N=286×5). For comparison, the descriptive analysis was based on two steps: 1) All observations were categorized into two groups: a) high performance cities with corresponding variable's value above (or equal) the overall mean, and b) low performance cities with variable's value below the overall mean. 2) The distribution of the high performance variables within cities.

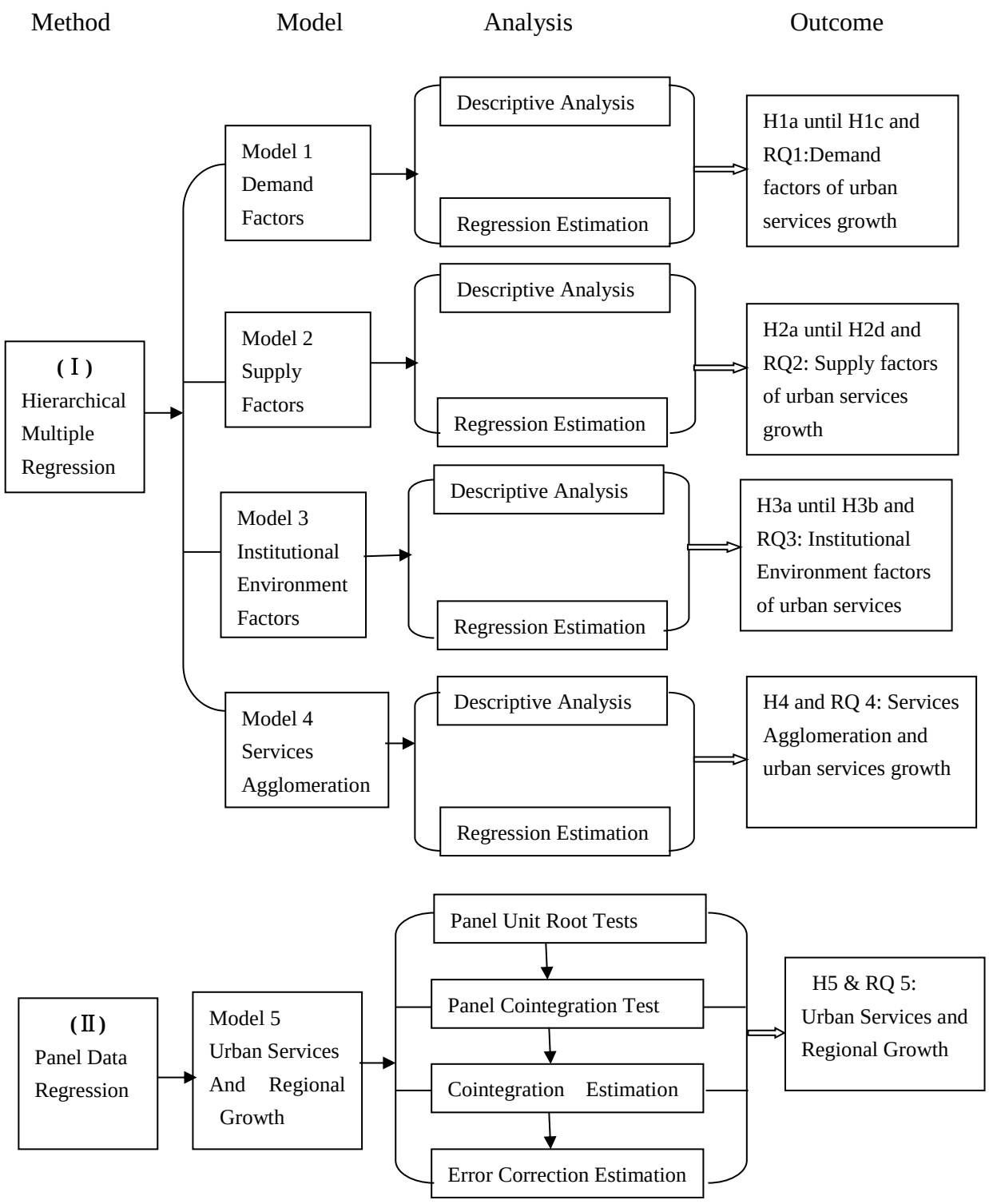


Figure 5.1
Outline of Research Finding

5.1.1.1 Urban Services

Table 5.1 presents the descriptive results of dependent variable namely urban services growth (URBS). From the total 1430 observations, its overall mean was RMB28.64 billion, with the substantial range from RMB0.72 billion to RMB1,050 billion.

Table 5.1
Descriptive Result of Urban Services during 2006-2010

Variable	Frequency	Percentage	Mean	Min	Max	Std. Deviation
URBS (RMB billion)						
Overall	**1430**	**100%**	**28.64**	**0.72**	**1050**	**7.858**
High performance (≥overall mean)	261	18.2%	119	288.9	1050	15.271
Low performance (< overall mean)	1169	81.8%	8.18	0.72	28.6	7.768

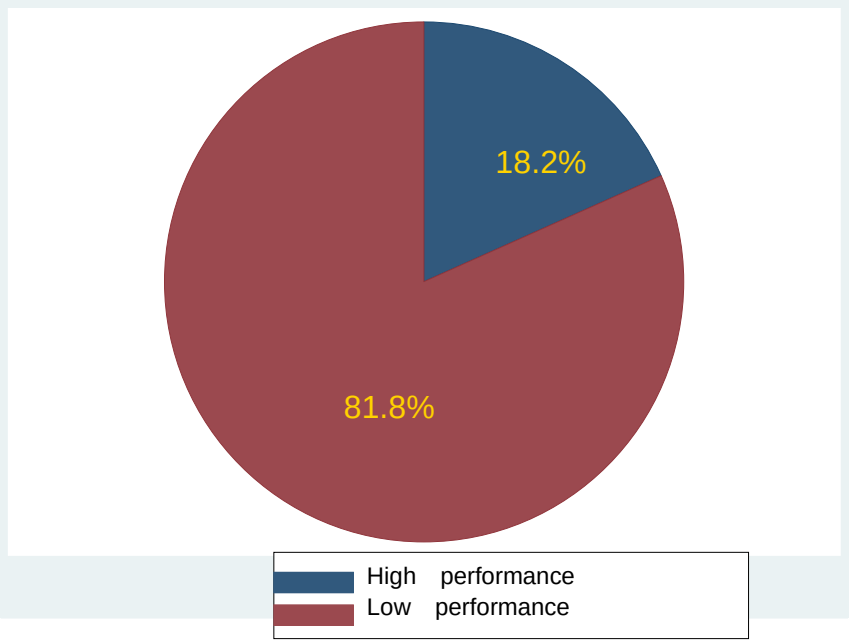


Figure 5.2
Urban Services Performance

As shown in Table 5.1 and Figure 5.2, based on the overall average performance, it is known that 18.2 percent cities had a high performance in urban services growth, with the mean value of RMB119 billion, i.e., RMB90.36 billion higher than the overall average value (RMB28.64 billion). However, the majority 81.8 percent cities had a low performance in urban services with the mean value of RMB8.18 billion, and by average was RMB20.46 billion lower than overall mean. This finding suggests that, the majority cities in China had a low performance in urban services growth.

Figure 5.3 further display the regional distributions of high performance urban services (above overall mean) among Eastern, Central, and Western cities.

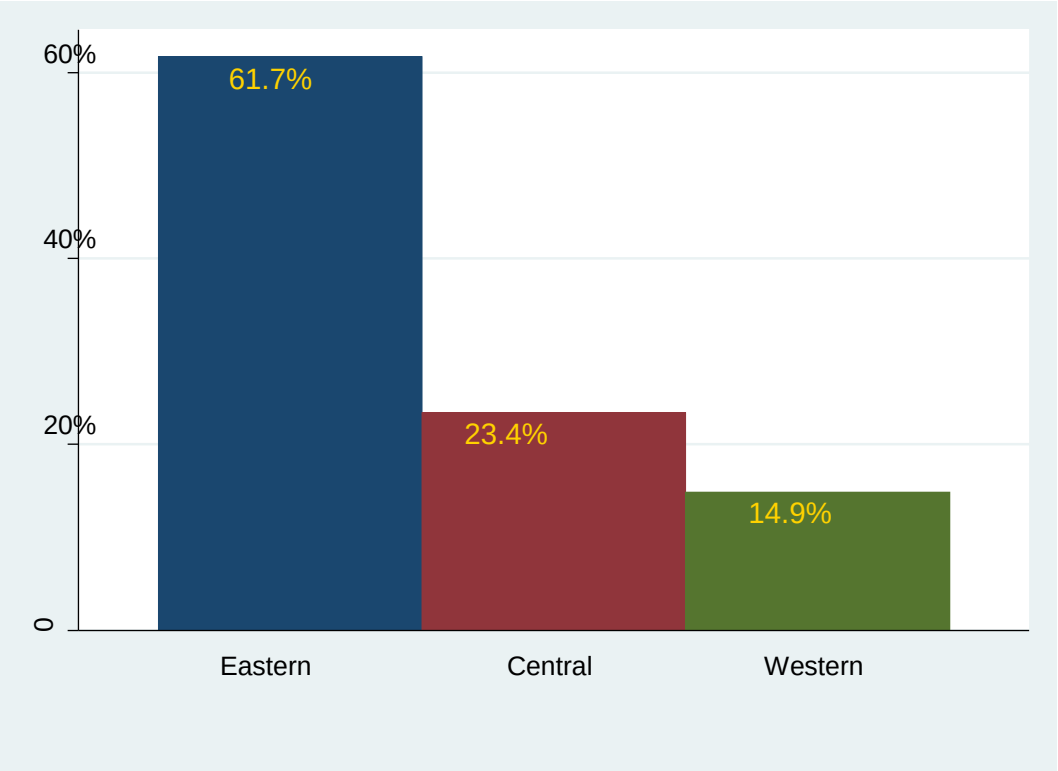


Figure 5.3
Regional Distribution of High Performance Urban Services

The results show that, from the 261 observations with high performance for urban services, 61.7 percent were from Eastern cities, 23.4 percent from Central cities, and the lowest 14.9 percent was from Western cities. This indirectly revealed substantial regional variations and gaps for urban services growth among cities in China.

5.1.1.2 Influencing Factors

As discussed in Chapter 4, 10 influencing factors were identified as the independent variables contributing towards urban services growth. Three were demand factors namely per capita income (PI), urbanization (URBAN), and division of labour (DIV); four were supply factors namely labour (SL), physical capital (SK), human capital (HUM), and productivity (SP) in urban services; the other two were institutional

factors namely services marketization (MARK) and openness (OPEN); and the last one was urban services agglomeration (USAG).

In order to show the performance of these influencing factors, Figure 5.4 displays their distributions with high performance (above the overall average value) in the cities (see Appendix E1 for the details).

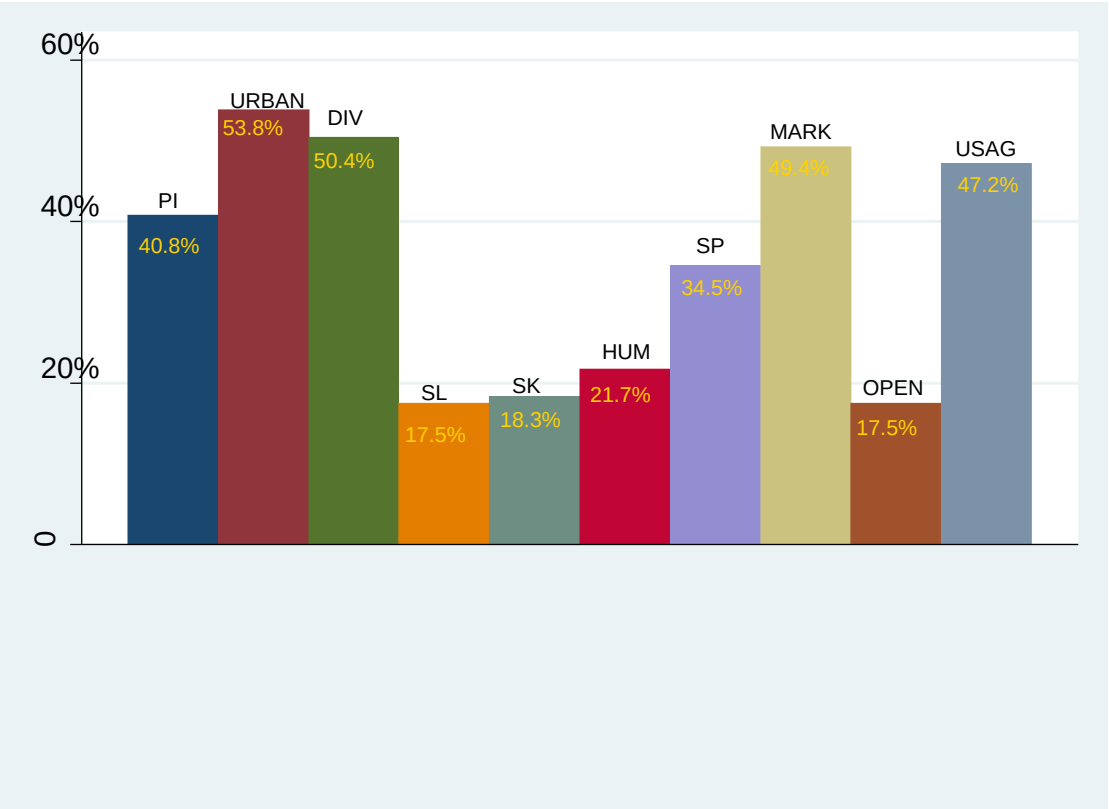


Figure 5.4
Distribution of High Performance Influencing Factors

Majority cities had high performance in urbanization (URBAN, 53.8 percent), division of labour (DIV, 50.4 percent), marketization (MARK, 49.4 percent), services agglomeration (USAG, 47.2 percent), and per capita income (PI, 40.8 percent) level, followed by 34.5 percent cities with high performance in services productivity (SP), and 21.7 percent cities in human capital (HUM) respectively. Meanwhile, 18.3 percent cities registered high performance in physical capital (SK), and 17.5 percent cities for both labour (SL) and services openness (OPEN) levels.

These results further implied that the development level of these influencing factors were different in cities, and more cities developed better in demand factors (e.g.,

URBAN, DIV, and PI), marketization (MARK), and services agglomeration (USAG), compared to those of supply factors (SP, HUM, SK, and SL), and services openness level (OPEN).

The regional differences in these influencing factors among the cities were also examined. Appendix E2 and Appendix F (Figure 5.5 - 5.8) show the distribution of high performance influencing factors (above the overall mean values) among cities in the Eastern, Central, and Western regions.

Cities in the Eastern region have a higher per capital income level (58.8 percent) compared to cities in Central (28.5 percent) and Western (12.7 percent) regions, implying a well-developed economic growth in the Eastern region. Similarly, 41.4 percent cities in the Eastern and 40.5 percent in the Central regions had higher performance in urbanization rate, compared to cities in the Western region (18.1 percent). This implied a high urbanization level in Eastern and Central regions, compared to lagged cities in Western region. However, it was basically the same distribution for labor division in secondary industry among cities in all regions (around 30 percent), implying a general balance labor division level in secondary industry among the three regions.

For high performance supply factors, it was obvious that more than 50 percent of the cities in Eastern region had a high performance in the supply of physical capital (60.9

percent), labor (54.4 percent), and human capital (51.5 percent) for services, implying that the cities in Eastern region had an absolute advantage in the high inputs of supply factors, unlike that of cities in Central and Western regions. In addition, as for the cities with high services productivity, the difference was small between Eastern (37.5 percent) and Central (34.4 percent) regions, compared to that of Western region (28.1 percent), implying a relatively higher factor productivity in Eastern and Central cities.

The regional distribution of institutional factors showed that a 37.9 percent of the cities in Eastern region and 37 percent in Central region had a high services marketization level compared to cities in the Western region (25.1 percent). However, services openness showed substantial variations among the regions. An extremely high 77.7 percent was from Eastern cities, followed by 20.5 percent from Central cities, while only 1.8 percent was from Western cities. These results indicated great imbalance of institutional enviroement, especially services openness (FDI) among regions, implying that cities in Eastern region had absolute advantage in institutional factors compared to lagged cities in the Western region, due to regional disparities in economic development level, accessibility, infrastructures, auxiliary industries, preferencial polices, and historical factors (Hu et al., 2012).

In terms of services agglomeration, cities in the Eastern and Central regions dominated with similar 38.1 and 37.2 percent respectively, while only 24.7 percent

for the Western region. This implied further that cities in Eastern and Western regions had relative higher services agglomeration compared to cities in the Western region.

In summary, the descriptive results of these influencing factors revealed the following: (1) The performance of these factors was different based on the location of the cities, which may influence the role of the factors in urban services growth; and (2) The regional distribution of these factors further showed that economic developed Eastern cities had an advantage over Central and Western cities in all of these factors. Thus, the regional differences in these factors may influence the balanced growth of urban services among the regions.

Therefore, in order to make specific estimations on the contributions of these factors on urban services growth, as well as to check whether regional differences of these factors had an effect on urban services growth, the hierarchical multiple regression was conducted, and discussed in next section.

5.1.2 Hierarchical Regression Estimations

The effects of demand, supply, institutional environments, and services agglomeration factors on urban services growth were examined through hierarchical multiple regression of Model 1 until Model 4, respectively.

Before the estimations, several diagnostic tests such as, normality, multicollinearity, and homoscedasticity tests were conducted to ensure that these regression models met the Best Linear Unbiased Estimator (BLUE) assumptions (Tabachnick & Fidell, 2007; Hair et al., 2010). When the regression model achieved BLUE, its expected value was equal to the true value and it had minimum variance (Gujarati, 2003).

As for normality, however, this study did not perform the normality test, as the 1,430 observations would be significantly large to apply the Central Limit Theorem, as proposed by Gujarati (2007). As the sample sizes increased, a non-normally distributed variable would be distributed normally.

To check for multicolinearity issues, this study performed the Variance Inflation Factor (VIF) tests on Model 1 until Model 4. The results showed that there were no serious multicollinearity problems, as the VIF values for all the variables in Model 1 until Model 4 were far less than 10 (Hair et al., 2006). See Table 5.2 and Appendix G for details.

The existence of heteroscedasticity problem (the variance of error-term is not equal or constant) may result in biased estimated coefficients with misleading higher *t* and F values (Cheng et al., 2001). Hence, to check for heteroskedasticity, the study performed Breusch-Pagan-Godfrey tests on the estimated Model 1 until Model 4 (Gujarati, 2003). The results (see Appendix G) showed that all the p-values of

chi-squared statistics of Model 1 until Model 4 were less than 5 percent of significance, indicating the existence of heteroskedasticity issues. To overcome this problem, the Heteroskedasticity Consistent Standard Error Estimation (Robust estimations) was used on the regression Model 1 until Model 4. Except for the *t*-ratio differences, Robust estimations produced a similar result with the OLS estimations; therefore, this method was suitable, as suggested by Wooldridge (2009).

The Heteroskedasticity Consistent Standard Error Estimation (Robust estimations) of Model 1 until Model 4 is summarized in Table 5.2 (see Appendix G for details), and the results are discussed in detail in the following section.

Table 5.2

Summary of Hierarchical Regression Estimations: Model 1- Model 4

Variables	**Model 1 (Step 1)**		**Model 2 (Step 2)**		**Model 3 (Step 3)**		**Model 4 (Step 4)**	
	Robust Coefficients	**VIF**	**Robust Coefficients**	**VIF**	**Robust Coefficients**	**VIF**	**Robust Coefficients**	**VIF**
Constant	8.489***		7.959***		8.464***		7.803***	
LnPI	0.889***	1.27	0.148***	2.01	0.159***	2.01	0.223***	2.12
URBAN	0.430***	1.08	0.324***	1.07	0.234***	1.07	0.200***	1.07
DIV	0.117***	1.00	0.029***	1.01	0.015***	1.02	0.019***	1.02
LnSL			0.333***	2.55	0.273***	2.82	0.292***	2.84
LnSK			0.448***	3.97	0.374***	5.25	0.361***	5.27
LnHUM			0.142***	2.81	0.096***	2.8	0.043*	3.10
SP			0.433***	1.77	0.330***	1.86	0.413***	1.99
MARK					0. 057**	1.4	0.019	1.41
LnOPEN					0.123***	3.21	0.129***	3.22
USAG							0.560***	1.32
$Area_1$	0.935***	1.85	0.657***	1.98	.344***	2.58	0.321***	2.59
$Area_2$	0.469***	1.58	0.487***	1.73	.236***	2.20	0.210***	2.21
R^2	0.4072		0.7521		0.7891		0.7986	
Adjusted R^2	0.4051		0.7504		0.7872		0. 7966	
R^2 Change	0.4072		0.3449		0.037		0.0095	
F-statistics	115.72***		495.91***		526.19***		518.73***	
Sig.F-statistics	0.000		0.000		0.000		0.000	
F–Change	115.72***		449.74***		32.15***		51.71***	

Note:***, **,* indicates degree of significant at 1% ,5% and 10% level respectively

Generally, all the F-values of Model 1 until Model 4 (which explain the overall significance of models) were found to be significant at 1 percent level, as all the p-values of F-statistics were less than 0.01 (sig. F=0.000), indicating that Model 1 until Model 4 had high goodness of fit in predicting the relationship between influencing factors and urban services growth. Furthermore, the value of R^2 increased from 0.4072 in Model 1 to 0.7986 in Model 4, indicating that more influencing factors were added into the models, the overall explanation between

independent variables (demand, supply, institutional environment, and services agglomeration) and dependent variable (urban services growth) would improve. This finding further proved that all the factors indeed influenced urban services growth. Their specific contributions towards urban services are discussed in detail as follows.

5.1.2.1 Demand Factors and Urban Services Growth

H1a until H1c were formed to determine the impacts of demand factors (per capita income, PI; urbanization, URBAN; and division of labour, DIV) on urban services growth. The estimated R^2 was 0.4072 (Model 1 in Table 5.2), meaning 40.72 percent variance in urban service growth was explained by the three demand factors.

The robust beta coefficients in Model 1 could be used to explain their contributions towards urban services growth. It was found that all these three factors were significantly positive to urban services growth, thus H1a until H1c were supported and provided answers to research question 1, relating the effects of demand factors on urban services growth (pg. 6).

Per capital income (PI) had the highest contribution with coefficient of 0.889, followed by urbanization (URBAN) with 0.430, and the division of labour (DIV) with 0.117. The finding was in line with previous studies by Hu et al. (2009), Xie (2010), Zeng and Yuan (2010), and Cheng et al. (2010) that with improvement in per capita income, urbanization, and division of labour, a larger demand for either

consumer or producer services in urban would be generated, thereby providing an incentive for the expansion of the aggregate output of urban services.

The dummy variables of $Area_1$ and $Area_2$ also registered significant values at 1 percent level, indicating that when holding the other variables constant, urban services in Eastern ($Area_1$) and Central cities ($Area_2$) were accordingly 0.93 and 0.46 percent higher compared to Western base cities. This finding further justified the descriptive results on the existence of regional differences in demand factors (refer Appendix E2), and further justified that the regional differences in demand factors would influence the balanced growth of urban services in cities.

5.1.2.2 Supply Factors and Urban Services Growth

H2a until H2d related the effects of supply factors (labour, SL; physical capital, SK; human capital, HUM; and services productivity, SP) on urban services growth, as examined in Model 2. The estimated R^2 was 0.7521, indicating that a total 75.21percent of variance in urban service growth was explained by both the demand and supply factors. The results also showed that there was an additional 0.3449 ($0.7521 - 0.4072$) increase in the R^2 from Model 1 to Model 2. This implied that while holding demand factors constant, the inclusion of other four supply variables (labour, physical capital, human capital, and services productivity) into Model 2 resulted in an additional 34.49 percent increase in urban service growth, and the contribution was highly significant with F change of 449.74 at 1 percent significance

level. This finding suggested that supply factors contribute significantly towards urban services growth.

The estimated robust beta values in Table 5.2 of Model 2 show that all the supply factors were significantly positive. Thus, H2a until H2d were supported and provided answers to research question 2, relating the effects of supply factors on urban services growth (pg. 6).

Specifically, physical capital (LnSK) registered the highest contribution with coefficient of 0.448, followed by services productivity (SP, 0.433), labour (LnSL, 0.333), and human capital (LnHUM, 0.142). These findings further revealed that, among the four supply factors, physical capital, services productivity, and labour inputs contributed significantly to urban services growth. The findings supported previous studies that urban services growth in China does not only directly depend on the quantity of factors (physical capital and labour inputs), but also allocation efficiency of the factors in services (i.e., productivity) (Li, 2008; Hu, 2008; Chen, 2009; Wei et al., 2010).

However, despite the positive role of human capital, its contribution appeared to be too small compared to the contributions of the other three supply factors. This can be attributed by the insufficient supply of human capital in urban services, as reflected in the descriptive statistics (see Table in Appendix E1) that the average amount of

human capital in urban services was far lower than that of labour input in urban services. The finding was also consistent with Hu (2008), Zeng (2008), Yang and Su (2009), and Zhang et al. (2011) who point out that the current internal structure within urban services in China was still dominated by traditional labour-intensive sectors, while the proportion of knowledge and human capital- intensive service sectors was lagged behind. Thus, the employment structure within urban services was still dominated by unskilled labour force. Subsequently, insufficient supply of human capital in urban services suppressed its effects.

The dummy variables of $Area_1$ and $Area_2$ were positively significant at 1 percent level. In other words, when holding other variables constant, urban services in Eastern ($Area_1$) and Central cities ($Area_2$) were 0.65 percent and 0.48 percent higher than that in Western cities, respectively. This finding also justified that regional differences in supply factors would influence the balanced urban services growth.

5.1.2.3 Institutional Factors and Urban Services Growth

H3a and H3b, which concerned on the relationship between institutional environment factors and urban services growth, were examined in Model 3 (see Table 5.2). The estimated R^2 was 0.7891, suggesting that 78.91 percent of the variation in urban services growth was together explained by demand, supply, and institutional environment factors. The results also showed that there was 0.037 (0.7891－0.7521) increase in R^2 from Model 2 to Model 3. This finding implied that, while holding

demand and supply factors constant, the inclusion of the other two institutional environment variables (services marketization and services openness) into Model 3 resulted in an additional 3.7 percent increase in urban service growth, and the effect was significant with F change of 32.15 at 1 percent of significance level. This finding suggested that institutional factors contributed positively to urban services growth. However, compared with the R^2 changes in Model 1 and Model 2, the R^2 change in Model 3 was relatively smaller. This means that the effects of institutional environment factors were not as strong as the effects of both demand and supply factors.

The robust coefficients in Table 5.2 (Model 3) revealed that when holding demand and supply factors constant, the coefficients of services marketization (MARK) and openness level (LnOPEN) were all significantly positive as expected. Thus, H3a and H3b were supported, and provided answers to research question 3 concerning the effects of institutional factors on urban services growth (pg. 6). However, services openness (FDI) carried a higher contribution (with coefficient of 0.123) towards urban services, compared to that of services marketization (with coefficient of 0.057), implying that when holding other factors constant, for every 1 percent increase in services openness and marketization level, there would be corresponding 0.123 percent, and 0.057 percent increase in urban services output, respectively. This finding could be attributed by the fact that the current marketization in some services sectors such as finance, insurance, accounting, telecommunication, healthcare, and

education was imperfect that it prohibited the effect of marketization on services growth (Wei, 2009; Hu, 2011; Hu and Ma, 2012; Yan and Wang et al., 2013).

The dummy variables of both $Area_1$ and $Area_2$ were positively significant at 1 percent significance level, indicating that when holding other variables constant, urban services growth in Eastern ($Area_1$) and Central cities ($Area_2$) was 0.34 percent and 0.23 percent higher than that in Western cities, respectively. This finding justified that the regional differences in institutional factors had an effect on balanced growth of urban services.

5.1.2.4 Services Agglomeration and Urban Services Growth

H4 predicted that spatial agglomeration of services contributed positively to urban services growth. The estimated R^2 for Model 4 was 0.7986, indicating that 79.86 percent of the variation in urban services growth was explained by all demand, supply, institutional environment, and services agglomeration factors. The results also showed that, compared to Model 3, there was a 0.0095 (0.7986－0.7891) increase in the R^2 of Model 4, indicating that after holding demand, supply, and institutional environment factors constant, the inclusion of urban services spatial agglomeration (USAG) into Model 4 resulted in an additional 0.95 percent increase in urban service growth, and the effect was significant with F change of 51.71 at 1 percent significance level, verifying its positive effect on urban services growth.

The robust coefficient of Model 4 showed that when holding demand, supply, and institutional environment factors constant, the relative contribution of services agglomeration towards urban services growth was significantly positive with coefficient of 0.56, implying that while holding other factors constant, for every 1 percent increase in services agglomeration degree, there would be a 0.56 percent increase in urban services output growth. The result provided the answer to research question 4 on the effect of services agglomeration on urban services growth (pg. 6), and further verified H4 that services agglomeration could improve urban services productivity through its economics of scale and agglomeration effects, thereby facilitating urban services growth in China (Guan, 2012; Wang and Fan et al., 2013).

The dummy variables of $Area_1$ and $Area_2$ were both positively significant at 1 percent significance level, indicating that when holding other variables constant, urban services growth in Eastern ($Area_1$) and Central cities ($Area_2$) was respectively 0.32 percent and 0.21 percent, higher than that in Western cities, showing that regional differences in services agglomeration had an effect on urban services growth.

In summary, the hierarchical regression estimations based of Model 1 until Model 4 demonstrated that demand, supply, institutional environment, and services agglomeration factors indeed had implications on urban services growth. All these 10 factors were found to be positively related to urban services growth, as justified by H1a until H4, respectively.

5.2 Panel Data Estimations on Urban Services and Regional Growth

Model 5 was used to test the relationship between urban services and regional economic growth with time series panel data. As discussed in section 4.2.2 (pg. 118), before the regression estimations, the panel unit root test was first conducted to ensure data stationary, and then the Pedoni tests were conducted to examine the long-run cointegration relation between urban services and regional growth. The results for panel unit root and cointegration tests are described in details in Appendix H and I, respectively. The analyses were presented based on the Eastern, Central, and Western regions of China.

The panel unit root results (see Appendix H) showed that in Eastern, Central, and Western regions, all the variables were stationary at their first difference value. This means that all the variables were integrated in order one, ***I(1).***

The Pedroni cointegration test results of the Eastern, Western, and Central regions (see Appendix I) justified that there were long-run cointegration relationships between the variables.

5.2.1 The Long-Run Cointegration Estimation

As mentioned in section 4.2.2, after confirmation of the long-run cointegration relationship, the next step was to select specific type of panel data model for the cointegration equation through Chow and Hausman tests. The results of the tests (see

Appendix J) lead us to conclude that the fixed effect model was the most appropriate for the panel cointegration estimations for the three regions with the following equation:

$$LnRGDP_{it} = a_i + \beta_1 LnRURBS_{it} + \beta_2 LnRIND_{it} + \beta_3 LnRINV_{it} + \beta_4 LnRFDI_{it} + \beta_5 RUSAG_{it} + \xi_{it} \quad (5.5)$$

As had been justified by Yu (2010), Zhang (2012), Gao (2012) and Wang et al. (2012), the OLS estimation technique should be appropriate for the fixed effect cointegration Model. Since, the resudial series generated from the OLS estimation would be applied as the Error Correction item (ECT) for the following short run estimations, as suggested by Gao (2012) and Zhang et al. (2012).

Therefore, the study adopted the OLS estimation for the evaluation of the long-run cointegration effect of urban services on regional growth (H5) in the three regions respectively. Table 5.3 presents the OLS estimation results for fixed effects of Model 5.

Table 5.3

Co-integration Estimation of Model 5

Variables	**Eastern Coefficient**	**Central Coefficient**	**Western Coefficient**
C	0.666***	1.072***	1.141***
	(6.22)	(3.94)	(6.17)
LnRURBS	0.530***	0.496***	0.444***
	(28.97)	(25.66)	(11.97)
LnRIND	0.490***	0.471***	0.507***
	(25.10)	(18.79)	(14.30)
LnRINV	0.052	0.035	0.017**
	(0.55)	(1.71)	(2.27)
LnRFDI	0.011***	0.016	0.015
	(2.69）	(1.29)	(0.85)
RUSAG	0.029	0.153	0.015
	(0.67)	(1.88)	(0.16)
Adjusted -R^2	0.98	0.98	0.88
F-Statistic	9942.26***	4193.76***	2907.73***

Note : 1. Numbers in brackets are t values.

2. ***represent the t-values are significant at 1% level

As presented in Table 5.3, the long-run cointegration for Eastern, Central, and Western regions followed a similar pattern. The results showed that the estimated R^2 in Eastern, Central, and Western regions were 0.98, 0.98, and 0.88, respectively, with the corresponding F values significant at 1 percent level. These findings suggested that the estimated cointegration models in all of these three regions had high goodness of fit.

Concerning the coefficients of urban services (RURBS), they were all positively significant at 1 percent level in the three regions, verifying that urban services significantly contributed to the long-run regional economic growths. Thus, H5 stating that urban services growth positively contributed to regional economic

growth in China was supported.

However, as far as the contribution of urban services towards regional growth is concerned, there were regional differences. The contribution was the highest in Eastern region with coefficients of 0.53, implying that urban services contributed more than half of the regional growth in Eastern regions, and greater than that of secondary industry, followed by the coefficient of 0.49 in Central region, and 0.44 in Western region. This finding was consistent with previous studies by Pan (2010), Yu (2010), Yao (2011), Zhang (2012), Wang (2012), and Tian et al. (2013) who found that the Eastern region with well-developed urban services received a rapid regional economic growth, compared to the other two regions. They further explain that urban services growth was essentially the industrial evolution of urban economy. Well-developed urban services could promote regional economy by decreasing transaction costs, accelerating factor accumulation, and improving resource utilization efficiency.

5.2.2 The Short-Run Estimation of Error Correction Model

After supporting the existence of a long-run relationship between urban services and regional growth, the Error Correction Model (ECM) was constructed to examine the short-run adjustment elasticity of urban services on regional growth. The absolute value of error correction coefficient provided a measure of the average adjustment speed towards long-run equilibrium, and it was expected to be negative to ensure

long-run convergence (Atesoglu, 2005). Therefore, basing on the long cointegration estimations, the study treated the residual series in the long-run cointegration equations as error correction terms. The short-run error correction estimation results (ECT_{t-1}) in Eastern, Central, and Western region are presented in Table 5.4.

Table 5.4
Result of Error Correction Estimation

Variables	**Eastern Coefficient**	**Central Coefficient**	**Western Coefficient**
C	0.1304	0.0939	0.1722
	（1.15）	（0.70）	(1.22)
ΔLnRURBS	0.5004***	0.4905***	0.3812***
	（23.91）	(24.06)	(13.41)
ΔLnRIND	0.5033***	0.4938***	0.5129***
	（23.75）	(22.19)	(9.75)
ΔLnRINV	-0.0078	-0.0921	-0.0570
	(-0.48)	(-0.38)	(-0.27)
ΔLnRFDI	-0.0004	-0.0138	-0.0055
	(-0.04)	(-1.05)	(-0.69)
ΔRUSAG	-0.0222	-0.2073***	-0.1533
	(-0.34)	(-2.72)	(-1.31)
ECT_{t-1}	-0.5801 ***	-0.4161***	-0.2331***
	(-3.11)	(-3.71)	(-3.21)
Adjusted R-squared	0.954	0.964	0.878
F-statistic	210.9***	218.47***	65.30***

Note: 1. Δ: the first difference

2. The statistics in brackets are t-values of the coefficients.

3. *** represent coefficients are significant at 1% significance level.

As shown, considering the impacts of the first difference of urban services (ΔLnRURBS), the estimated coefficients in Eastern, Central, and Western regions were 0.50, 0.49, and 0.38 respectively, and all of them were statistically significant at 1 percent level. The results indicated that in the short run, after controlling other variables, for every 1 percent change in urban services (ΔLnRURBS), it would bring

0.5 percent, 0.49 percent, and 0.38 percent increase in Eastern, Central, and Western growth, accordingly. The results implied that the short-run change in urban services did have an immediate positive influence on regional economic growth.

In terms of the effects of the first difference of urban secondary industry (ΔLnRIND), the estimated coefficients in Eastern, Central, and Western regions were all positively significant at 1 percent level. These results indicated that in the short run, a 1 percent change in urban secondary industry in the three regions would increase regional growth by 0.50 percent, 0.49 percent, and 0.51 percent, accordingly. The results also justified that in the short run, the change in secondary industry also had an immediate positive influence on regional growth.

However, as for the short-run changes in physical capital investment (ΔLnRINV), FDI (ΔLnRFDI), and urban services spatial agglomeration (ΔRUSAG) in the three regions, their coefficients were all negative and statistically insignificant. These results indicated that in the short run, the changes in these three control variables had no immediate contributions towards regional growth in all of three regions.

Table 5.4 also shows that the negative sign of ECT were all significant at 1 percent level in the three regions as expected, which was a further proof of the existence of a stable long-run relationship (Bannerjee et al., 2004). Specifically, the coefficients of ECT_{t-1} were -0.58, -0.41, and -0.23 in Eastern, Central, and Western regions,

respectively. This means that the deviation from the long-run growth in regional GDP would be corrected by 0.58 percent in Eastern region, 0.41 percent in Central region, and 0.23 percent in Western region over the following year, implying that the adjustment took place quickly, especially in the Eastern region. The results once again confirmed the existence of the stable long-run cointegration relationship between urban services and regional growth, and provided further support for the H5 in this study.

5.3 Summary

This chapter provides results of the research models developed in Chapter 4. First, the hierarchical multiple regression results revealed the relationship between influencing factors (demand, supply, institutional environment and services agglomeration) towards urban services growth in China. The panel data model was developed to test the relationship between urban services growth and regional economic growth (H5).

The hierarchical regression analyses from Model 1 until Model 4 revealed that per capita income (H1a), urbanization (H1b), division of labour (H1c), labour (H2a), physical capital (H2b), human capital (H2c), services productivity (H2d), services marketization (H3a), services openness (H3b), and services spatial agglomeration (H4) had significantly positive effects on urban services growth. Among all these factors, the demand, supply, and services agglomeration contributed greatly to urban

services growth in China. However, the institutional factors had positive but relatively smaller contributions. Other than that, the panel data estimations on H5 showed the existence of positive short-run and long-run equilibrium relationship between urban services and regional growth in all regions. The overall results are presented in Table 5.5.

Table 5.5
Summary of Research Findings

Statement of Hypotheses	**Directions of Effects**	**Results of Hypotheses**
H1a Per capita income influences urban services growth.	Significantly positive	Supported
H1b Urbanization influences urban services growth.	Significantly positive	Supported
H1c Division of labor influences urban services growth.	Significantly positive	Supported
H2a Labor input is related to urban services growth.	Significantly positive	Supported
H2b Physical capital is related to urban services growth.	Significantly positive	Supported
H2c Human capital is related to urban services growth .	Significantly positive	Supported
H2d Services productivity is related to urban services growth.	Significantly positive	Supported
H3a Urban services growth is influenced by services marketization.	Significantly positive	Supported
H3b Urban services growth is influenced by services openness.	Significantly positive	Supported
H4 Urban services growth is influenced by services agglomeration.	Significantly positive	Supported
H5 Urban services growth contributes to regional economic growth.	Significantly positive	Supported

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

As urban services are becoming an important driving force for both urban and national economies in China, analyzing and interpreting factors that influence urban services growth are central to the growth of the country. Furthermore, the economic disparities among regions make the role of urban services very imperative towards a balanced regional growth. Hence, this study analyzed the factors influencing urban services growth based on the demand, supply, institutional environment, and services agglomeration. This study also investigated the effect of urban services on regional economic growth in China.

Accordingly, two main models were applied. First, the hierarchical multiple regression models to test the effects of influencing factors on urban services growth, and second, the panel data model to examine the effect of urban services on regional growth.

The hierarchical multiple regression models identified and confirmed 10 independent variables that affected urban services growth in China, namely (1) demand factors that consisted of per capita income (H1a), urbanization (H1b), and division of labor (H1c); (2) supply factors that were associated to labour (H2a), physical capital (H2b), human capital (H2c), and services productivity (H2d); (3) institutional factors

including services marketization (H3a), services openness (H3b), and (4) services spatial agglomeration (H4).

The study revealed that the demand and supply factors contributed most to urban services growth. Indeed, the institutional environment and services spatial agglomeration were also important for urban services growth. However, the contributions of institutional factors were too small compared to services agglomeration.

The study also conducted panel data analysis to estimate the contribution of urban services on regional economic growth. The results revealed the existence of long-run positive effect of urban services on regional economic growth in all Eastern, Central, and Western regions of China.

In fact, despite of focusing only on the long-run effect, the study also made further investigation on the short-run dynamic relationship through Error Correction Model (ECM). The findings suggested a significant short-run relationship between urban services and regional economic growth in all three regions in China**.** The significant negative sign of Error Correction iterm (ECT) indicates the speed of adjustment back to the long run equilibrium for regional growth (RGDP) after a short run shock by the changes in urban services. Therefore, this effective adjust mechanism is the further justification of the stable long-run relations between urban services and

regional economic growth.

6.1 Policy Implications

Based on those findings, the study would like to suggest four policy recommendations for policy makers to plan and implement strategies towards a more balanced urban services growth, especially in China.

6.1.1 Expanding Demand

The demand factors are critical to urban services growth, as they determine the potential market capacity for services. Their effects on urban services growth work through mainly two channels. First is by improving final demand for consumer services due to improvement in per capital income, as consumer services are of high income elasticity. In addition, the high population agglomeration in urban brought out by urbanization could also generate a huge demand for consumer services.

The other channel is by improving intermediate demand for producer services brought out by urbanization and division of labour. The increased demand for urban services would further promote its aggregate output growth. Therefore, from the demand point, a general demand expansion strategy is required to promote urban services growth. These strategies include the measures to improve residents' income and to promote urbanization and division of labour. Accordingly, the specific policy recommendations are as follows:

1) The Chinese government should focus on implementing fiscal and tax policies to adjust the income allocation mechanism, to narrow the income gap, and to improve residents' income.

2) The government should implement polices to accelerate urbanization process, such as measures to encourage the development of medium-sized and small cities, changing the current rural-urban structure of citizenship into a single, unitary structure, extending public services (e.g., education, cultures, healthcare, public facilities) to all migrant labours from rural to cities to improve population agglomeration in urban areas, thereby increasing market demand for consumer and public services.

3) The government should facilitate and accelerate services outsourcing activities, besides accelerating the development of small and medium services enterprises to deepen division of labour and the externalization of services.

6.1.2 Increasing Factors Supply

This study reveals that both the quantity and quality (productivity) of factor inputs (i.e., labour, physical capital, and human capital) are positively related to urban services growth. Generally, there are two ways how these factors contribute towards urban services growth. First is by increasing the total amount of factor inputs in urban services. Second is by improving the quality of factor inputs in urban services.

Accordingly, it is recommended that:

1) A continuous industrial upgrading policy towards services in urban economy should be a viable strategy to attract the movement of producing factors (e.g., physical capital, labor, human capital). Hence, this movement of producing factors will increase the factor accumulation and supply in urban services. Indeed, instead of just increasing the overall quantities of factor inputs, particular attentions should be given towards improving factors' quality and productivity.

2) Human capital inputs in urban services should be improved as an effective way to reinforce factor quality and productivity in services. Related policies such as periodic training, improving remuneration benefits, and instilling professionalism of the workforce should be instituted. In addition, efforts towards setting labor standards should be implemented, including the standard for recruitment, improvement in health and education facilities, provision of mandatory basic education and on-the- job training programs.

6.1.3 Conducive Institutional Environments Factors

Favorable institutional environments such as high services marketization and openness level are essential determinants in promoting urban services growth. A high services' marketization level indicates that the factors are effectively allocated, thus helpings to improve factor productivity in urban services. A high services openness level indicates a high participation degree of services in international activities. This

high level of services openness is beneficial to services growth through enlarged market effect and positive spillover effects. Therefore, to improve services marketization and openness level, the government should decrease its economic involvement on resources allocation and implement internalization strategy for services.

For China, it is notable that the contributions of institutional factors are too small compared to contributions of the other factors (demand, supply, and services agglomeration). As services in China have been under long-term government control, the current market mechanism and openness level are still imperfect, hence, limiting their contributions towards urban services growth. Thus, the recommendations are as follows:

1) The Chinese government should speed up the marketization reform in urban services to ensure a fair and efficient market environment on resources allocation. This includes measures to reduce market barriers for private services enterprises' participation, to improve the legal system to strengthen the protection of prosperity rights for services enterprises, and to strengthen the supervisions on government intervention in services activities.

2) The government should further open urban services sectors to international market, such as finance, insurance, telecommunication, and public services. High services openness level is helpful to create a fair market competition environment,

and thus attracting the inflows of FDI for urban services growth.

6.1.4 Promoting Urban Services Agglomeration

Spatial agglomeration could improve services productivity through economics of scale and agglomeration effects. This study suggests that more focus should be given on modern services agglomeration such as finance, logistics, business services, and information services especially in the super, mega, and large cities with high services agglomeration degree.

On the other hand, the traditional labour-intensive services such as catering, hotel, maintenance, and entertainment services could be diverted to the medium and smaller cities as these cities could take full advantage of the increasing returns to scale effects to promote rapid growth of urban services.

6.1.5 Narrow Regional Gaps in Urban Services

This study proves that urban services contributed toward both the short-run and long-run regional economic growth. Hence, the services-led industrial policies are important in the sustained economic growth of China.

However, the study found the existence of regional gaps concerning urban services' effects on regional growth in China. Thus, the government should do the following, in order to narrow the regional economic gaps between the Eastern and Western

regions:

1) To increase fiscal expenditures on urban services investment (especially on urban public services and related infrastructures and facilities, e.g., public transportation, public education, public healthcare, public welfare services and others) to the lagged Western region to improve its economic environment for urban services growth. The *Go West Policy* implemented in 2000 should be an effective way to address the winding regional economic disparities by building basic urban infrastructures in Western region. This could directly boost investment in related urban services of Western region in the short run. Whereas, in the long run, the quality of infrastructures could boost the productivity and competitiveness of the services and economic growth in the Western region.

2) Implementing some preferential fiscal, financial, and tax policies to urban services in Western regions. This is helpful to attract more private capital (including FDI) inflows in the services of that region, thereby contributing to Western services and economic growth.

6.2 Future Research

This study intended to extend factors influencing urban services growth by including the institutional environments and services spatial agglomeration as additional factors for analysis. The analysis was conducted via hierarchical multiple regression

techniques and the panel Vector Error Model.

Nevertheless, this study encountered several critical limitations such as follows:

1) The intention to probe influencing factors of urban services growth in China was restricted due to data constraints. Only overall service industry was involved, not the specific service sectors. Consequently, the results may not be universally true for overall service sectors in China due to the high heterogeneity and many subdepartments within these sectors. Therefore, a future focus could be conducted to analyze influencing factors on specific service sector (e.g., the producer services of finance, insurance, commerce, R&D services; the consumer services of hotel, entertainments, housing services; the social public services of education, healthcare, welfare and others). This would potentially increase the degree of clarity on the influencing factors directly, as well as to make comparative analysis between sectors.

2) Statistics on FDI and physical capital investment for urban services growth were only available since 2000. Thus, only a short panel time frame of 10 years (2001-2010) was applied. The results would be better if more panel data were available.

3) This study focused on the effect among Eastern, Central, and Western regions, while ignoring the effect within a region (intraregion) itself. Therefore, future study

could further look into this issue, as this could help to further confirm the contribution of urban services for regional growth.

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