

# Urban Services Growth in China: The Effect of Demand Factors

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## Abstract

Urban area are the main spatial carrier for services growth in China, and there are various factors influencing urban services growth in China. This paper investigated the factors influencing urban services growth from the demand side. Specifically, it measured the contributions of per capital income, urbanization, and division of labor on urban services growth by using hierarchical multiple regression technique with data of 2009-2013 from 286 sample cities. Generally, all the demand factors were positively significant to urban services growth. Especially, per capita income and urbanization contributed towards urban services growth most significant, followed by division of labor. Therefore, a general demand expansion strategy including measures to improve residents' income, promote urbanization, and deepen division of labor, should be given greater priority to promote urban services growth.

**Keywords:** urban services, demand factors, per capital income, urbanization, division of labor

## 1. Introduction

China has made remarkable economic achievements since reform and opening up in 1978 and her economic structure have been gradually optimized and deepened. As China entered the post-industrialization period since late 1990s, one important phenomenon was the increasing role of services in economic growth (Cheng, 2012). Urban services played important role in urban as well as national economy in China. Since urban are places with dense population, developed economic basis, abundant information and human resources, large number of economic organizations and complex economic relations, therefore urban are becoming main spatial carrier for services growth in China (Li, 2011; Chen, 2012; Jiang et al., 2012). In 2013, the output value of urban services created by cities accounted for 70.62 percent in national services output value, with the share of employment in urban services of 15 percent in national total services employment, and 51 percent in urban total employment, indicating a higher degree of services growth in urban area. (China, 2014).

The argument concerning factors influencing services growth initially originated from the demand side. Demand factors in this paper refer to the elements that could affect or determine people's need and consumption on service products. Earlier studies such as Fisher (1935), Clark (1940), 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 & Syrquin, 1989; Appelbaum, 1999). Other demand factors that receive great attention are urbanization and division of labor (Chenery, 1975; Singelmann, 1978; Henderson, 1997; Tiffen, 2003; 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.

As for China, related studies on relationship between demand factors and services growth mainly focus on per capita income (Li, 2011; Hu, 2012; Xie et al., 2013), and urbanization (Gao, 2011; Zeng, 2012; Wei et al., 2012). However, little attentions had been attached on division of labor. In fact, from the producing chain and transaction cost theory, division of labor is important demand factors in urban services growth, since it determines both the intermediate demand for producer services and final demand for consumer services.

In view of above, this paper posits that demand factors of income level, urbanization and division of labor play critical role together in urban services growth. Accordingly, in order to examine the effects of these demand factors, two research questions are generated in this paper:

- 1) What are the demand factors influencing urban services growth?
- 2) What are the contributions of demand factors on urban services growth?

## 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. 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 divided into four levels namely (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; and (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. The cities at prefectural level and above are further divided into five sizes based on the nonagricultural population in urban areas.

From 1990 to 2013, the total number of cities at prefecture level and above increased 50 percent from 186 to 286 (China<sub>3</sub>, 1991-2014). 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.

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, 2012). The rapid growth of urban economy in China has been accompanied by the great structural changes in urban (see Figure 1).

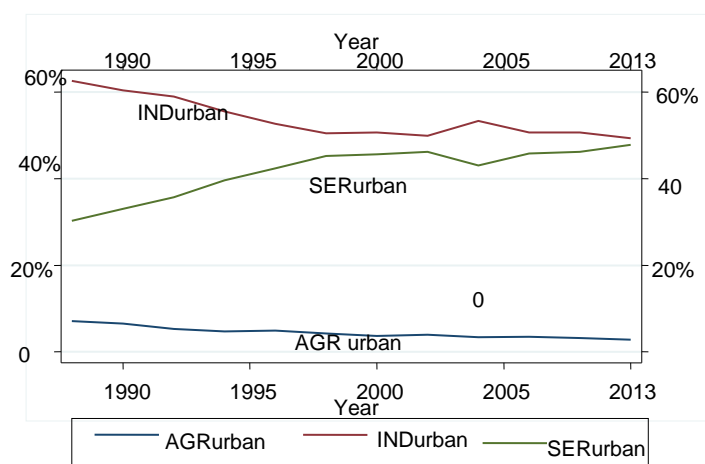


Figure 1. The proportion of urban sectoral output value to urban GDP

Source: China Statistical Yearbook 1991-2014.

Figure1 shows that during 1990-2013, 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 Severe Acute Respiratory Syndrome (SARS) epidemic. However, its proportion declined further after 2005. Interestingly, the proportion of urban services to urban GDP gradually increased from 33 percent to 47.8 percent (1990-2013), indicating the strength of urban services contribution towards urban economic growth.

### 3. Hypotheses Development

The paper identified three demand factors that influenced urban services growth, namely per capita income, urbanization, and division of labor. Therefore, the development of hypotheses are discussed as follows.

#### 3.1 Per Capita Income

According to Engel's law (1857, cited in Hu, 2012) and Maslow's Hierarchy of Needs Theory (1943, cited in Hu, 2012), 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, 2012; Xie, 2013). 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 (2011), Ni (2011), and Hu et al. (2012) 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, 2013). Therefore, the first hypothesis is as follows:

**H1: Per capita income is related to urban services growth.**

#### 3.2 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, 2012). 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, 2012; Guo, 2012). 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:

**H2: Urbanization effectively influences urban services growth.**

#### 3.3 Division of Labor

Division of labor refers to the division, specialization and independence of economic activities, or the specialization of the economy (Hu, 2012). It could promote urban services growth in two ways. First, the deepening division of labor 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 labor in manufacturing industry provides pulling force for its growth.

In the context of China, industrial division of labor mainly refers to division of labor 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 labor within secondary industry (especially manufacturing sectors) generates greater intermediate demand for producer services, hence promoting the growth of producer services (Hu, 2012; Cheng et al., 2012).

Although division of labor 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, 2012). As a result, producer services begin to develop independently (Chen, 2012). Therefore, the third hypothesis is as follows:

**H3: Division of labor effectively influences urban services growth.**

#### 4. Research Methodology

In order to determine the relationships between demand factors and urban services growth in China, hierarchical multiple regression model is used in this paper. Since hierarchical multiple regression estimates the partial marginal effects of independent variables on the dependent variable by minimizing the sum of squared errors. If the classical linear assumptions are not violated, these estimated partial marginal effects can be proven to be BLUE (Best Linear Unbiased Estimator) (Rebecca, 2008).

##### 4.1 Sample and Data

A sample of 286 prefecture and above cities from 30 provinces in China were selected since they contribute more than 70 percent of national total services growth, excluding Tibet, Hong Kong, Macao, and Taiwan due to data unavailability. The data covered 5 years from 2009 to 2013, and all these secondary data are collected from corresponding China Statistical Yearbook 2010-2014, and China Urban Yearbook 2010-2014. The analysis were based on STATA12.0. These data are further specified as dependent and independent variables that are specified as follows.

##### 4.2 Measurement of Variables

###### 4.2.1 Dependent Variable: Urban Services Growth

Urban services growth can be measured either by services gross output value, output growth rate, or per capita output value. However, this study adopted the gross output values (GDP) of urban services as a proxy for their growth level, and later the values were transformed into logarithm to avoid the heteroscedasticity problem (Huo, 2012; Hu et al., 2012).

###### 4.2.2 Independent Variables

###### 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, 2012; Xie et al., 2013):

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

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, 2011; Guo, 2012; Hu et al., 2012). It is measured based on the proportion of nonagricultural population to total urban population using the following equation (Hu et al., 2012):

$$Urban = V / N$$

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 Labor

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

$$DIV_i = 1/2 |E_{im} / \sum E_{ik} - E_{nm} / \sum E_{nk}|$$

where,

i: urban i;

m:the manufactory industry;

k: the secondary industry;

Eim: the employment in manufactory industry in urban i;

$\sum E_{ik}$ : the total employment in secondary industry in urban i;

Enm: the total national employment in manufactory industry;

$\sum E_{nk}$ : 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.

#### 4.2.3 Dummy Variable

In this paper, the hierarchical multiple regression analysis was based on 286 cities, involving a 5-year period. However, in order to control the disturbances of regional differences on urban services growth, the cross-section (individual) dummy variable namely Area was introduced (Gao, 2011; Zeng, 2012; Pan et al., 2012). The paper grouped the 286 sample cities into Eastern, Central, and Western regions, while the Western cities were used as a base. Subsequently, two regional dummies were introduced:

1).  $Area_1 = 1$  if eastern cities, otherwise 0;

2).  $Area_2 = 1$  if central cities, otherwise 0.

#### 4.3 Hierarchical Multiple Regression Model

This paper used hierarchical regression estimation to compute the significance and influence of each demand factors on urban services growth. The influence could be measured by assessing the value of R-square change when each variable was added into the model. Specifically, three steps of hierarchical regression were used to compute the significance of the three factors respectively. The procedures were:

##### Step 1: Model 1 for H1

The first step was to assess the effect of per capital income on urban services growth using Model 1:

##### Model 1

$$LnURBS = \alpha_0 + \beta_1 lnPI + \beta_2 Area_i + \varepsilon \quad (1)$$

where,

LnURBS: the natural logarithm of urban service growth;

LnPI: the natural logarithm of per capital income;

$Area_i$ : dummy variable,  $Area_1=1$  if Eastern cities, otherwise 0;  $Area_2=1$  if Central cities, otherwise 0;

$\varepsilon$ : the random error term.

##### Step 2: Model 2 for H2

##### Model 2

$$LnURBS = \alpha_0 + \beta_1 lnPI + \beta_2 URBAN + \beta_3 Area_i + \varepsilon \quad (2)$$

Where,

URBAN: urbanization level.

##### Step 3: Model 3 for H3

##### Model 3

$$LnURBS = \alpha_0 + \beta_1 lnPI + \beta_2 URBAN + \beta_3 DIV + \beta_4 Area_i + \varepsilon \quad (3)$$

Where,

DIV: division of labor.

In each step, the estimated proportion of variance in urban services growth as predicted from the three demand factors was assessed through the  $R^2$  change. Their respective contributions were estimated by corresponding slope coefficients ( $b_i$ ) and associated  $t$ -ratios.

## 5. Data Analysis and Results

Data analyses start with descriptive statistics of all the demand variables in regression Model, followed by the regression estimation.

### 5.1 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 (2009-2013), the related variables were pool data (combined for all the five years) with a total 1,430 observations ( $N=286 \times 5$ ). For comparison, the descriptive analysis was based on two steps: 1) All observations were categorized into two groups: a) high performance observations (cities) with corresponding variable's value above (or equal) the overall mean, and b) low performance observations (cities) with variable's value below the overall mean. 2) The distribution of the high performance variables within cities.

#### 5.1.1 Descriptive Result of Dependent Variable

Figure 2 presents the descriptive results of dependent variable namely urban services growth (URBS).

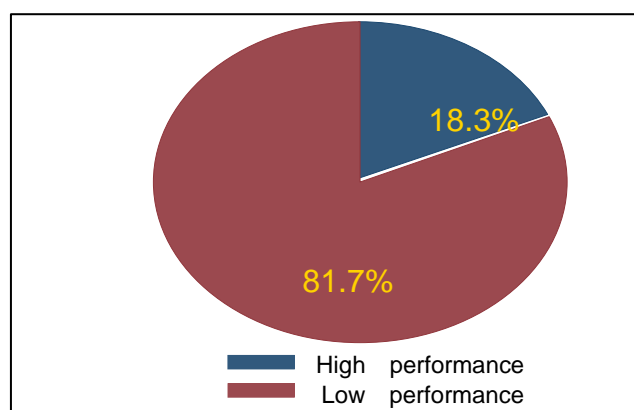


Figure 2. Urban services performance

As shown in Figure 2, based on the overall average performance, from the total 1,430 observations, 18.3 percent of the cities (261 observations) had a high performance in urban services growth. However, the majority 81.7 percent of the cities (1,169 observations) had a low performance in urban services. This finding suggests that the majority cities in China had a low level of urban services growth.

Furthermore, Figure 3 further display the regional distributions of high performance urban services.

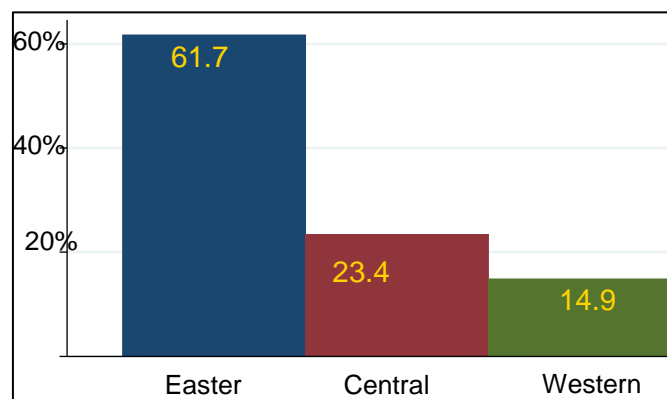


Figure 3. Regional distribution of high performance urban services

The results show that, from the 261 observations of high performance urban services (above overall mean), 61.7 percent (161 observations) were from Eastern cities, 23.4 percent (61 observations) from Central cities, and the lowest was 14.9 percent (39 observations) from Western cities. This also indicated substantial variations and

gaps for urban services growth among regions in China.

### 5.1.2 Descriptive Result of Independent Variables

Table 1 shows the descriptive results of the independent demand variables.

Table 1. Urban services: descriptive results of demand factors

<i>Demand Variables</i>	Frequency	Percentage	Mean	Min	Max	Std. Deviaton
<b>Per Capita Income (Yuan )</b>						
<b>overall</b>	<b>1430</b>	<b>100%</b>	<b>32262.84</b>	<b>3610</b>	<b>249040</b>	<b>23.183</b>
high performance ( $\geq$ overall mean	583	40.8%	54108.94	32270	249040	23.267
low performance ( $<$ overall mean)	847	59.2%	18690.12	3610	32255	7.478
<b>Urbanization (%)</b>						
<b>Overall</b>	<b>1430</b>	<b>100%</b>	<b>60.81</b>	<b>23.67</b>	<b>89.67</b>	<b>0.413</b>
high performance: ( $\geq$ overall mean	770	53.8%	88.22	60.82	89.67	0.165
low performance( $<$ overall mean)	660	46.2%	32.35	23.67	60.65	0.152
<b>Division of Labor</b>						
<b>Overall</b>	<b>1428*</b>	<b>100%</b>	<b>0.1807</b>	<b>0.0002</b>	<b>0.367</b>	<b>0.330</b>
high performance: ( $\geq$ overall mean	720	50.4%	0.2664	0.1808	0.367	0.447
low performance( $<$ overall mean)	708	49.6%	0.0936	0.0002	0.1806	0.052

It is known that 53.8 percent cities with high performance in urbanization (URBAN), followed by 50.4 percent cities in division of labor (DIV). Meanwhile, 40.8 percent cities registered high performance in per capita income (PI). These results further implied that the development level of these influencing factors were different in cities. The regional differences in these influencing factors among the cities were also examined.

Figure 4 shows the distribution of high performance demand factors (above the overall mean values) among cities in the Eastern, Central, and Western regions.

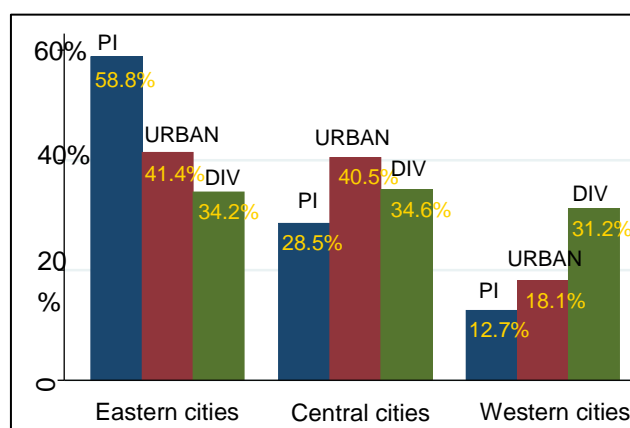


Figure 4. High performance: demand factors

It is known that 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 division of labour among cities in all regions (around 30 percent), implying a balanced industrialization growth level for all regions.

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.

### 5.2 Hierarchical Regression Estimations

The Heteroskedasticity Consistent Standard Error Estimation (Robust estimations) of Model 1 to Model 3 are shown in Table 2.

Table 2. Summary of robust estimations on model 1- model 3

Variables	Model 1(step 1)		Model 2 (step 2)		Model 3 (step3 )	
	Robust Coefficients	VIF	Robust Coefficients	VIF	Robust Coefficients	VIF
Constant	8.294143***		8.469964***		8.208448***	
LnPI	0.9357513***	1.22	0.8941693***	1.27	0.9136279***	1.31
URBAN			0.4315126***	1.08	0.4243485***	1.08
DIV					0.1201311**	1.06
Area <sub>1</sub>	0.968408***	1.84	0.9345163 ***	1.85	0.944637***	1.86
Area <sub>2</sub>	0.4881768***	1.57	0.4598165***	1.58	0.4796827***	1.60
R <sup>2</sup>	0.3942		0.4031		0.4053	
Adjusted R <sup>2</sup>	0.3929		0.4014		0.4032	
R <sup>2</sup> Change	0.3942		0.0089		0.0022	
F-statistics	166.35***		143.52***		191.62***	
F-Change	166.35***		20.883***		5.162***	

Note. \*\*\*, \*\*, indicate the statistics is significant at 1%, 5% significance level respectively.

Generally, all the F-values of Model 1 until Model 3 (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 3 had high goodness of fit in predicting the relationship between demand factors and urban services growth. Furthermore, the value of R<sup>2</sup> increased from 0.394 in Model 1 to 0.405 in Model 3, indicating that more demand factors added into the models, the overall explanation between independent variables and dependent variable (urban services growth) would improve. This finding further proved that all the demand factors indeed influenced urban services growth. Their specific contributions towards urban services are discussed in detail as follows.

Model 1 was formed to determine the impacts of per capita income (PI) on urban services growth. The estimated R<sup>2</sup> was 0.3942 (Model 1 in Table 4.2), meaning 39.42 percent variance in urban service growth was explained by per capita income. The robust beta coefficients in Model 1 shows that the contribution of per capita income on urban services growth is 0.935, and is significant at 1 percent level, thus H1 was supported. In Model 2, the estimated R<sup>2</sup> was 0.4031, indicating that a total 40.31 percent of variance in urban service growth was explained by both per capita income and urbanization. The results also showed that there was an additional 0.0089 (0.4031–0.3942) increase in the R<sup>2</sup> from Model 1 to Model 2. This implied that while holding per capita income constant, the inclusion of urbanization into Model 2 resulted in an additional 0.89 percent increase in urban service growth, and the contribution was highly significant with F change of 20.883 at 1 percent significance level. The robust coefficient of urbanization (URBAN) shows the contribution of urbanization on urban services growth was 0.431, and was significant at 1 percent level, thus H2 was supported. In Model 3, the estimated R<sup>2</sup> was 0.4053, indicating that a total 40.53 percent of variance in urban service growth was explained by per capita income, urbanization, and division of labor together. The results also showed that there was an additional 0.0022 (0.4053–0.4031) increase in the R<sup>2</sup> from Model 2 to Model 3. This implied that while holding per capita income and urbanization constant, the inclusion of division of labor into Model 3 resulted in an additional 0.22 percent increase in urban service growth, and the contribution was highly significant with F change of 5.162 at 1 percent significance level. The robust coefficient of division of labor (DIV) shows the contribution of urbanization on urban services growth was 0.120, and was significant at 5 percent level, thus H3 was supported.

Furthermore, Model 3 still revealed that when the three demand factors considered together, Per capital income (PI) had the highest contribution with coefficient of 0.913, followed by urbanization (URBAN) with 0.424, and the division of labor (DIV) with 0.120. The finding was in line with previous studies by Hu (2012) and Cheng et al. (2012) that with improvement in per capita income, urbanization, and division of labor, 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.



In addition, it is notable that the dummy variables of Area<sub>1</sub> and Area<sub>2</sub> in all of the three models were all found to register significant values at 1 percent level, indicating that when holding the other variables constant, urban services in Eastern (Area<sub>1</sub>) and Western cities (Area<sub>2</sub>) were accordingly higher compared to Western cities. This finding further justified that the regional differences in demand factors would influence the balanced growth of urban services in cities.

## 6. Conclusions and Recommendations

Based on those findings, the paper justified that the demand factors of per capital income, urbanization and division of labor are critical to urban services growth in China, 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 labor. 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 labor.

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 policies 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 labors 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 labor and the externalization of services.

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