

# Shanghai's Economic Internal Structure and Linkages with Domestic and International Markets: Input-Output Analysis

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## Abstract

*The purpose of this paper is to examine the change of Shanghai's internal economic structure and the linkages of Shanghai economy with the rest of China (ROC, domestic market) and the rest of the world (ROW, international market) based on the input-output tables of 1997, 2002, 2007 and 2012. The results indicate that Shanghai's economy over this period has become integrated more with the ROW than with ROC before 2008, but after 2008 financial crisis, the opposite phenomenon has happened. With respect to ROC, Shanghai is more of a supplier than a source of demand. With respect to ROW, however, Shanghai is both a supplier and a source of demand, reflecting a high degree of integration of Shanghai with the world market and the rest of China.*

**Keywords:** Shanghai Economy, ROC, ROW, Input-Output

## 1. Introduction

The Shanghai economy is a very important regional economy of China. At the beginning of 1990s, the Shanghai government took over *Pudong* (the area across the Huangpu River) and focused on it as the main developing area. At the same time, it speeded up economic reforms and embraced more openness. In order to adapt to changes in the domestic and international economy, Shanghai engaged twice in major upgrading of its economic structure. The first was in mid-1990s, when the Shanghai government selected automobile, information and communication technology (ICT), general electric equipment, petroleum, and chemical, steel, and modern home appliance manufacture as key industries to be developed.

However, towards the end of the 1990s, the Shanghai government realized the importance of service industries and therefore modified the list of key industries to be promoted to include business and trade services, financial and insurance service, and the real estate industry. Through a combination of high tech manufacturing and advanced business services, Shanghai aimed at becoming a major international metropolis and emerging as the leader of the Yangtze River Delta Economic Region and in fact of the Chinese economy as a whole (Wang, 2008). These two waves of upgrading resulted in major changes in the structure of Shanghai's economy and altered its links with the domestic and the international economy (Sun, 2005; Leng and Fei, 2006).

The purpose of this paper is to describe the main changes in Shanghai's economic structure and analyze the changes in Shanghai's external economic links in more detail. For this purpose, the paper uses the input-output data for 1997, 2002, 2007, and 2012, capturing both demand and supply side linkages.

## 2. The Framework of I-O Analysis of Shanghai Economy

Between 1993 and 2015, Shanghai's GDP growth rate averaged more than 9 percent per annum, and the GDP at constant 2000 price rose from 151.9 to 2496.5 billion Yuan (Figure 1). At the same time, the relative importance of Shanghai's economic links with the rest of China (ROC) and the rest of the world (ROW) changed.<sup>1</sup>

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<sup>1</sup> 'Rest of China' (ROC) refers to the mainland China other than Shanghai, while 'rest of the world' (ROW) means economies outside of the mainland China.

Between 1997 and 2002, the ratio of Shanghai's 'trade with ROC' to its GDP decreased from 107 to 96.7, whereas the ratio of Shanghai's trade with ROW to its GDP increased from 66.4 to 130 percent; between 2002 and 2007, the ratio of Shanghai's 'trade with ROC' to its GDP increased from 96.7 to 157, whereas the ratio of Shanghai's trade with ROW to its GDP increased from 130 to 193 percent; between 2007 and 2012, the ratio of Shanghai's 'trade with ROC' to its GDP increased from 157 to 284, whereas the ratio of Shanghai's trade with ROW to its GDP decreased from 193 to 174 percent (Figure 2).

The effects of regional growth can be divided into supply-side and demand-side sources. There are some papers analyzed the effect factors of Shanghai economic growth. Shi (2003) analyzed the sources of economic growth in Shanghai, and the results show the growth effect brought about by increasing internal demands is the source of economic growth in Shanghai. Li and Zhao (2005) analyzed the relation between ex-Import and economic development of Shanghai by empirical method, and demonstrated the ways and importance of directly and indirectly promoting effects of import and export on economic growth. Zhang et al. (2013) researched the Shanghai's economic development power in transformation period based on structure decomposition, demonstrated the role of export to ROW and ROC is the most important source during 2002-2007. Hang et al. (2015) analyzed the productivity promotion effect and Shanghai's economic transformation and escalation; the results show that the contributions of technical progress and technical catch-up to the promotion of productivity are rising, while the growth and productivity of manufacturing industries are reducing.

In analyzing the economy of a region within a country, except the internal economic structure, it is necessary to take into account its links with both the rest of the country and the world market at the same time (Miller and Blair, 2009). These links span trade, factor flows, government transfers, etc.<sup>2</sup> Input-output tables provide good information regarding trade linkages and changes in them over time. Figure 3 presents a scheme that conceptualizes Shanghai's internal economic structure and economic links with ROC and ROW.

### **3. Changes in Shanghai's Internal Economic Structure**

On the production/supply side, Figure 4 shows that between 1997 and 2002 the share of value added in Shanghai's gross output has increased only slightly from 31.4 to 32.3, indicating that the intermediate input intensity of Shanghai's economy has not changed that much during this period. However, between 2002 and 2007, the share of value added in Shanghai's gross output has decreased from 32.3 to 28.2, indicating that the intermediate input intensity of Shanghai's economy has increased about 4 percent points during this period. In contrast, between 2007 and 2012 the share of value added in Shanghai's gross output almost has not changed.

However, there have been notable changes in the composition of the value added itself, with the share of 'fixed capital depreciation' increasing from 12.1 percent in 1997 to 14.7 percent in 2002, to 15.5 percent in 2007, decreasing to 12.2 percent in 2012; the share of 'employee compensation' remained almost constant from 1997 to 2007 (34.4 percent in 1997, 35.0 percent in 2002, and 35.9 percent in 2007), but increased significantly to 41.6 percent in 2012. Therefore, capital accumulation rather than employment expansion therefore played a more important role in Shanghai's recent growth from 1997 to 2007. However, employment expansion rather than capital accumulation played a more important role in Shanghai's recent growth in 2012.

In addition, more surpluses is now captured by the government in the form of taxes, leading to an increase of share of 'net taxes' in the value added from 21.1 percent in 1997 to 24.6 percent in 2002, but decreased in 2007 (17.2 percent) and once again increased to 19.9 percent in 2012. The increases in the shares in value added of depreciation, labor, and taxes, have taken place at the expense of the share of capital, as reflected in the marked decline in the share of 'operation surplus' in the value added from 32.4 percent in 1997 to 25.7 percent in 2002, but increased in 2007 (31.5 percent) and once again decreased to 26.3 percent in 2012 (Figure 5).

On the disposal/demand side, Figure 6 shows that the shares of 'intermediate consumption,' 'household consumption,' and 'government consumption' in Shanghai's own output have changed respectively from 68.1, 10.5 and 2.7 percent in 1997 to 70.0, 11.7 and 3.4 percent in 2002, 72.9, 10.4 and 3.7 percent in 2007, 72.7, 12.4 and 4.0 percent in 2012. The share of 'gross fixed capital formation (GFCf),' on the other hand, has decreased from 18.7 percent in 1997 to 14.9 percent in 2002, 13.0 percent in 2007, and 10.9 percent in 2012.

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<sup>2</sup> The analysis of this paper focuses on the real economy, so that attention is paid to export, import of products and services between Shanghai on the one hand and ROC and ROW, on the other. Issues of factor flows and transfers between the regional and central governments are left for future studies.

However, GFCf and 'intermediate consumption' together account for 85 percent of absorption of Shanghai's output from 1997 to 2012, leaving only approximately 15 percent for 'household' and 'government consumption.' This indicates that most of Shanghai's production is geared toward production of intermediate and capital goods, not toward consumption goods.

#### **4. Shanghai's economic relationships with ROC and ROW**

Changes in Shanghai's economic structure were obviously associated with changes in Shanghai's external economic relationships, in particular with changes in the relative importance of Shanghai's own market, ROC, and ROW as sources of demand and supply for Shanghai. First of all, there has been a significant shrinkage of the role of Shanghai's domestic market as a destination of Shanghai's output from 1997 to 2012. The share of Shanghai's output absorbed by Shanghai domestic market decreased from 73.1 percent in 1997 to 61.7 percent in 2002, to 50.0 percent in 2007, and 34.5 percent in 2012 (Figure 7). Analogous shares of ROC and ROW respectively increased from 14.3 in 1997 to 19.3 in 2002, to 24.1 percent in 2007, to 43.7 percent in 2012, and 12.6 percent in 1997 to 19.0 percent in 2002, to 25.9 percent in 2007, to 21.8 percent in 2012. In other words, about 40 percent in 2002, 50 percent in 2007 and 65 percent in 2012 of Shanghai's output is now marketed outside of Shanghai, of which half is absorbed by the world market by 2007 but significantly exceeded by the rest of China in 2012. In this period, the change of world market was the main cause of this phenomenon. By the U.S. Sub-Prime Financial Crisis triggered by the global financial turmoil, Shanghai economic growth slowed down significantly from 2008 (Zhen, 2009).

Secondly, related shifts have occurred on the demand side too. The share of Shanghai's demand met by Shanghai's own output declined from 72.6 percent in 1997 to 63.8 percent in 2002, to 50.7 percent in 2007 and 34.9 percent in 2012 (Figure 8). Interestingly, the share of ROC in meeting Shanghai's demand has declined from 19.2 percent in 1997 to 12.3 percent in 2002, but has significantly increased to 20.4 percent in 2007 and 37.2 percent in 2012.

Moreover, there has been a large increase from 8.2 percent in 1997 to 19.2 percent in 2002 and 28.9 percent in 2007, in the role of foreign market in meeting Shanghai's demand, and has declined only slightly in 2012 (27.9 percent). Thus, while ROC absorbs relatively more (in 2012 compared to in 1997) of Shanghai's output, Shanghai itself is absorbing relatively more from the international market and relatively less from ROC (in 2002 and 2007 compared to in 1997) but more from ROC and less from the international market.<sup>3</sup> In other words, ROC is more a market for sale of Shanghai products rather than a source of its own supply. For the latter, Shanghai was more dependent on the world market from 1997 to 2007 but more dependent on the rest of China after 2008 financial crisis.

#### **5. Conclusions**

This paper examines the changes that have taken place from 1997 to 2012 in Shanghai's economic structure and its linkages with ROC and ROW. A comparative analysis of the data from Shanghai input-output tables of 1997, 2002, 2007 and 2012 shows that firstly, Shanghai's economy over this period has become integrated more with the ROW than with ROC, but after 2008 financial crisis the opposite phenomenon has happened. Secondly, Shanghai's economy is now firmly connected with ROC and ROW through both supply and demand linkages, whereas its connection with ROC runs more supply linkages than demand linkages.

Thirdly, with respect to ROC, Shanghai is more of a supplier than a source of demand, and with respect to ROW, however, Shanghai is both a supplier and a source of demand, reflecting a high degree of integration of Shanghai with the world market (globalization) before 2008 financial crisis. Fourthly, Shanghai has become a workshop for the entire world absorbing capital goods and intermediate inputs and exporting back finished manufacturing products. An accompanying feature of this process has been greater reliance of the Shanghai economy on capital accumulation and less on labor absorption for its expansion. Increasing importance of intermediate input in the process also finds reflection in the decline of the share of value added in gross output<sup>4</sup>.

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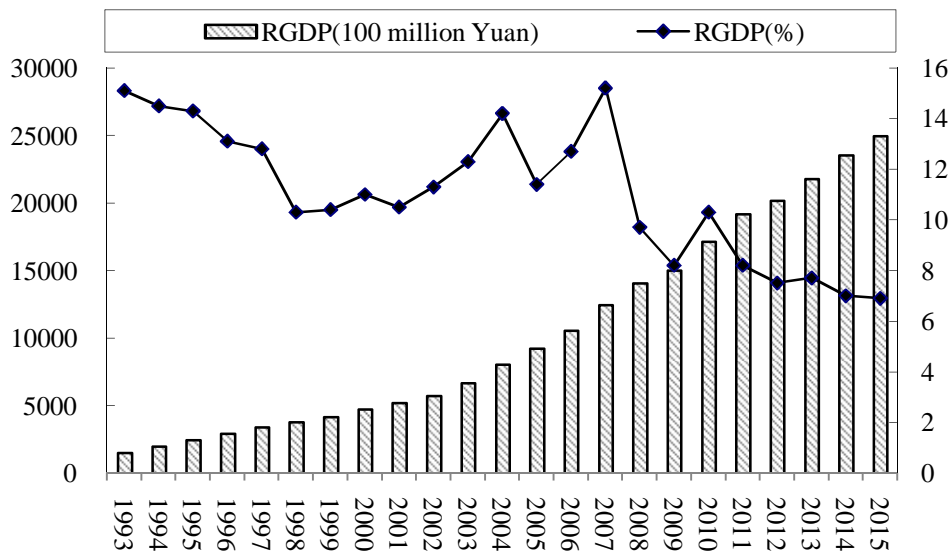
<sup>3</sup> In this paper, we highlight the total amount level of the relation between Shanghai, ROC and world market, not discuss in industries level in detail.

<sup>4</sup> To what extent the latter decline is also a manifestation of a decline in the efficiency of utilization of capital and labor is an important question that demands further investigation.

Because of the two way integration with the world market and the rest of China which has large scale domestic demand that Shanghai needs to cater to, Shanghai is more in a position to withstand adjustments in the fluctuations of global economy.

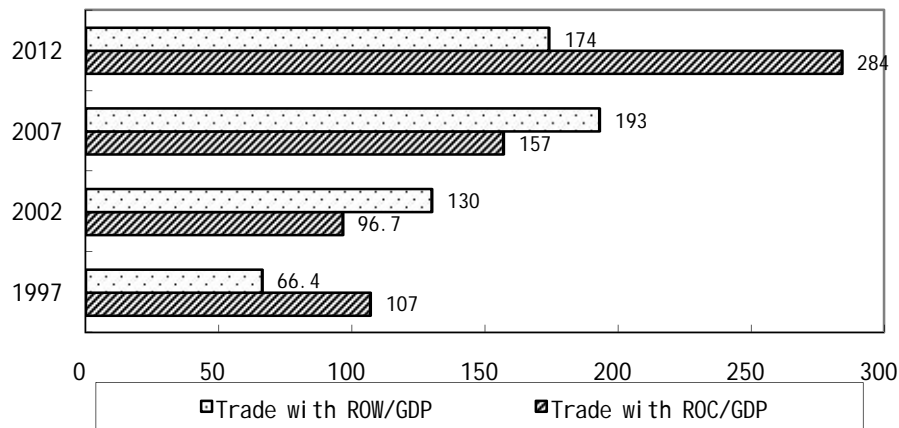
## 6. Reference

- Hang Jing, Zhang Zhiyuan, Yuan Libo. (2015). Productivity Promotion Effect and Shanghai's Economic Transformation and Escalation. *Shanghai Journal of Economics*, No. 1, 89-99 (in Chinese).
- Leng Mei, Fei Fang-yu. (2006). A Co-integration Analysis on the Relationship between Foreign Trade and Economic Growth in Shanghai. *Contemporary Finance & Economics*, No. 11, 103-106 (in Chinese).
- Li Hui-zhong, Zhao Da-ping. (2005). The Empirical Analysis of the Relation between Ex-Import and Economic Development of Shanghai. *Fudan Journal (Social Science Edition)*, No. 6, 99-104 (in Chinese).
- Lin Sun. (2005). Input-Output Analysis on the relationship between Domestic and International Markets for Shanghai Economic Development. *Shanghai Economy*, No.z1, 16-21 (in Chinese).
- Ronald E. Miller, Peter D. Blair. (2009). *Input-Output Analysis: Foundations and Extensions, Second Edition*, Cambridge University Press.
- Shi Lei. (2003) Sources of Economic Growth in Shanghai—One of the Series of "Analyses of Shanghai's Economy. *Fudan Journal (Social Sciences Edition)*, No.1, 11-16 (in Chinese).
- Wang Zhiping. (2008). Reflection on the Evolution of Shanghai's Development Strategy. *The Journal of Shanghai Administration Institute*, No.3, 58-67 (in Chinese).
- Zhang Yong-qing, SU Chao-wen, Liu Xiao-yu. (2013). The Research on Shanghai's Economic Development Power in Transformation Period based on Structure Decomposition. *Techno economics & Management Research*, No.9, 24-32 (in Chinese).
- Zhen Mingxia. (2009). Economic Development and Financial Crisis—The Analysis on Economic Period and Trend of Shanghai since 1990. *Shanghai Journal of Economics*, No. 11, 80-89 (in Chinese).



Data source: *Shanghai Statistical Yearbook, 2015*. The data of 2015 is from *Statistical Communique of Shanghai on the 2015*.

**Figure 1: Real GDP of Shanghai (Value and Growth Rate)**



Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Tables

Figure 2: Shanghai's Trade Dependence on ROC and ROW

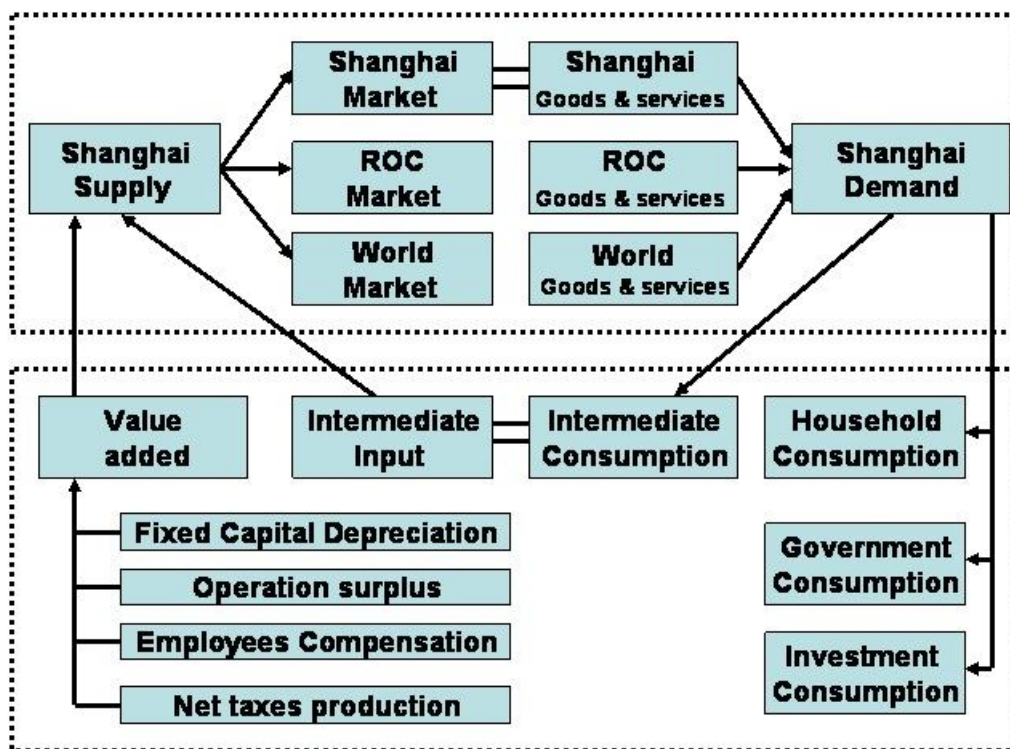
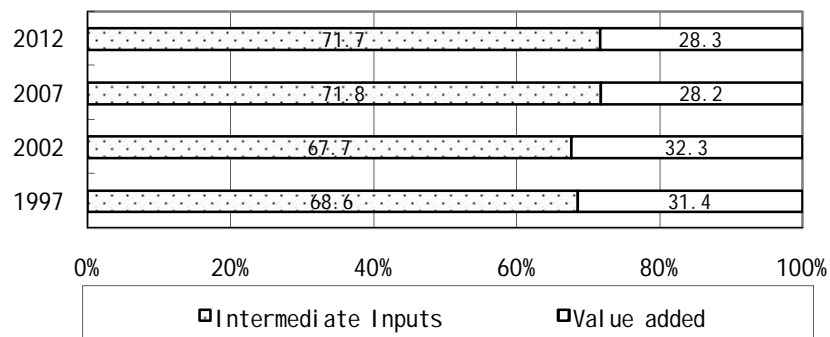


Figure 3: The Scheme of Shanghai's Economic Structure and Links with ROC and ROW



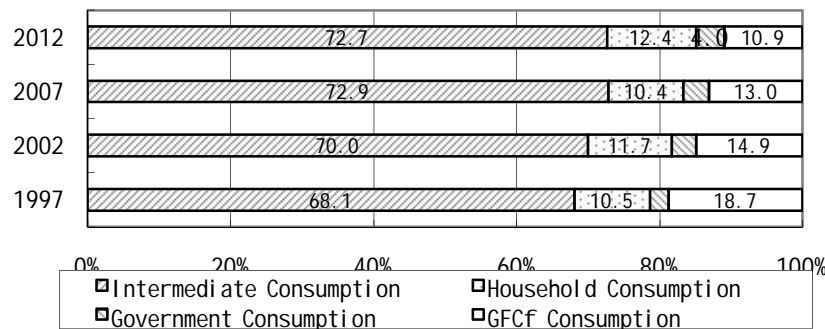
Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Table

Figure 4: Decomposition of Shanghai's gross output



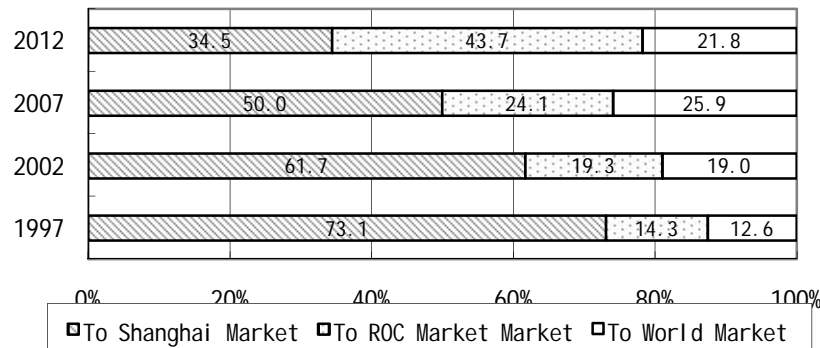
Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Table

**Figure 5: Decomposition of the value added**



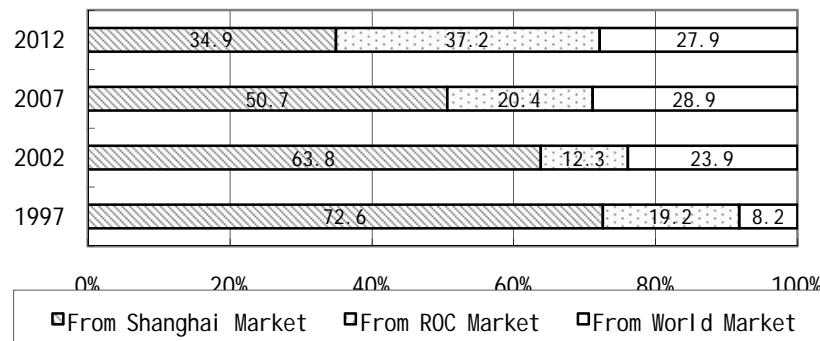
Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Table

**Figure 6: Use of Shanghai's output**



Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Table

**Figure 7: Changes in the destination of Shanghai output**



Data source: Calculated by 1997, 2002, 2007 and 2012 Shanghai Input-Output Table

**Figure 8: Changes in the sources meeting Shanghai demand**