Factor Decomposition of Share change of Tertiary Industry in China — Comparison with South Korea

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2010-9-9

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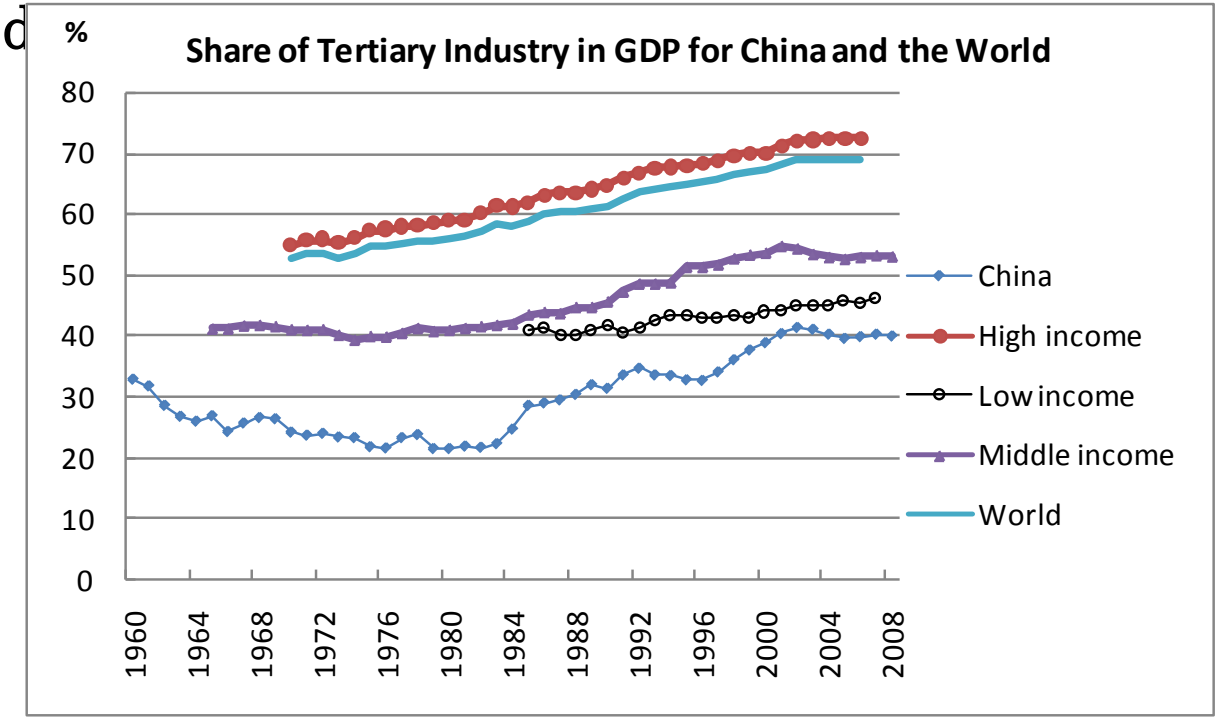
1. Introduction

- The share of tertiary industry in GDP in China is much lower than that of other countries with the similar economy d



1. Introduction

- The share of tertiary industry in China increased slowly since 2000
- What is the main factors driving the structural changes? Will the proportion of tertiary industry increase or still keep steady in the future, for example, the next 5 years?
- We answer this questions by an decomposition model based on constant price I/O tables.

2. Model and Data

- We analysis the change of tertiary industry share from the demand side

  including :the Household Consumption ,Investment,

  the Intermediate Input, the Net Export and Price.

2. Model and Data

The basic balance between supply and demand in volume term can be written as:

$$X = AX + F^{C} + F^{IN} + E - IM$$

Where $X = [x_i]$ represents the column vector of total output for each sector (industries), $A = a_{ij} = [x_{ij} / x_j]$ is the matrix of input-output coefficients. AX indicates the intermediate input. $F^C = [f_i^c]$ is the column vector of consumption. $F^{IN} = [f_i^{in}]$ is total investment vector(including gross capital formation and change in inventories). $E = [e_i]$ is export vector, $IM = [im_i]$ import vector, so $E - IM$ represents net export。

2. Model and Data

We can shift the above value-based equation to quantity-based equation:

$$X = AX + F^{C} + F^{IN} + E - IM$$

$$PX = APX + PF^{C} + PF^{IN} + PE - PIM$$

$$PX = (I - A)^{-1}(PF^{C} + PF^{IN} + PNE)$$

2. Model and Data

Since the proportion of the value added of tertiary industry in GDP is concerned, we get the value added vector according to the I/O table:

$$Y = VPX$$

$Y = [y_i]$ is the column vector of added value of each sector

$V = [v_j / X_j]$ is value added coefficient for each secto

2. Model and Data

then the share of value added of each sector in GDP can be shown by the following equation:

$$\frac{1}{\sum_i y_i} Y = \frac{1}{\sum_i y_i} VPX = \frac{1}{\sum_i y_i} V(I-A)^{-1}(PF^{C} + PF^{IN} + PNE]$$

Denote $\theta = \frac{1}{\sum_i y_i} Y \quad M = V[I-A]^{-1} \quad N = \frac{\left(F_i^{C} + F_i^{IN} + NE_i\right)}{\sum_i \left(P_i F_i^{C} + P_i F_i^{IN} + P_i NE_i\right)}$

Then $\theta = MPN$

2. Model and Data

the share change of each sector can be decomposed by the following equation:

$$\theta_1 - \theta_0 = M_1 P_1 N_1 - M_0 P_0 N_0$$

Where the subscript 1 denotes the terminal year, while the subscript 0 denotes the base year.

2. Model and Data

Denote subscript c as value at constant price:

$$\theta_1 - \theta_0$$

$$= \underbrace{(M_{c1}P_c\ N_{c1} - M_{c0}P_c\ N_{c0})}_{\text{the effect due to other factors other than price}}$$

$$+ \underbrace{[(M_1\ P_1\ N_1 - M_{c1}P_c\ N_{c1}) - (M_{c0}P_c\ N_{c0} - M_0P_0\ N_0)]}_{\text{the effect due to price change}}$$

2. The Data

The China constant prices I/O tables include the year of 1981、1983、1987、1990、1992 with constant price in 1990 and the tables of 1992, 1997, 2002, 2005 with constant price in 2000.

The constant price and current price I/O tables from 1975 to 2005 and 2007 of South Korea comes from the website of National Bureau of statistics of Korea。

3. The decomposition Result for China (%)

		1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	Total
The change of tertiary industry share in GDP		0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
Intermediate input		-0.9	2.9	-3.0	-3.1	-1.1	-2.3	-0.8	-8.3
Household consumption	Consumption ratio in GDP	-0.02	0.05	0.12	0.02	0.08	0.03	-0.02	0.3
	Consumption structure	2.3	0.2	0.6	-1.5	0.2	3.6	0.8	6.1
Government consumption		-0.6	-0.6	-1.0	1.1	-1.1	-0.6	-0.5	-3.3
Investment		0.1	-0.3	-0.1	0.1	0.1	-1.3	-0.4	-1.8
Net Export		-0.8	2.0	-0.7	0.4	1.1	1.0	-0.7	2.4
Price		-0.3	3.1	5.8	6.5	-1.0	8.1	-0.1	22.1
residual term		0.6	-0.1	0.3	-0.3	1.1	-1.2	0.2	0.7

1. Price was the most important factor to contribute to increasing the share of tertiary industry in GDP

The important role of price should be contributed to the fact that the service price raise quickly comparing with price of goods in other industries. Example: the price index of tertiary industry increased by 16.8 % while the price index of secondary industry decreased by 6.5% from 1997 to 2002

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Price	-0.3	3.1	5.8	6.5	-1.0	8.1	-0.1	22.1

2. Household consumption structure was also an important factor
to increase the share of tertiary industry.

The household consumption structure upgrade steadily along with the economic growth, the Engel coefficient decreased from 56.7%(urban) and 61.8%(rural) in 1980 to 36.7% and 45.5% in 2005.
the proportion of services in total household consumption increased from 29.4% in 1992 to 46.0% in 2005

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Household Consumption structure	2.3	0.2	0.6	-1.5	0.2	3.6	0.8	6.1

3. Net export also raised the share of tertiary industry in GDP

The effect of net export to the GDP structure is not steady in the whole periods. Depending on the change of net export structure .

- The proportion of services in total net export increased from 66% to 123.8% from 1997 to 2002. As a result, the share of tertiary industry increased 0.99 percentage point. ;
- The proportion of services in total net export decreased from 123.8% to 60.2% and the share of tertiary industry of GDP decreased 0.66 percentage points.

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Net Export	-0.8	2.0	-0.7	0.4	1.1	1.0	-0.7	2.4

4. The contribution from increasing of household consumption ratio is small.

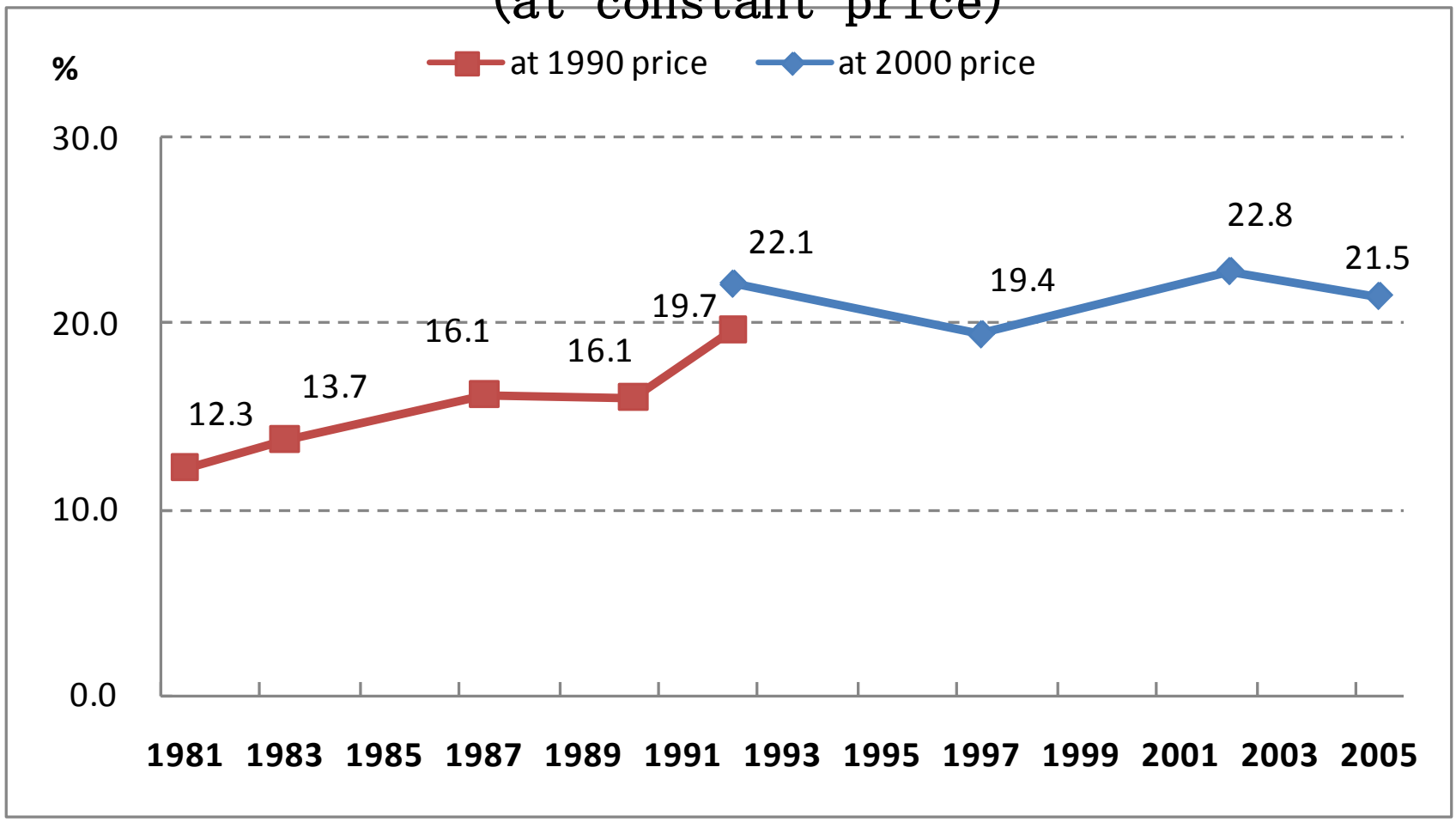
	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Consumption ratio in GDP	-0.02	0.05	0.12	0.02	0.08	0.03	-0.02	0.3

5. Intermediate input had the largest negative effects on the share of tertiary industry in GDP

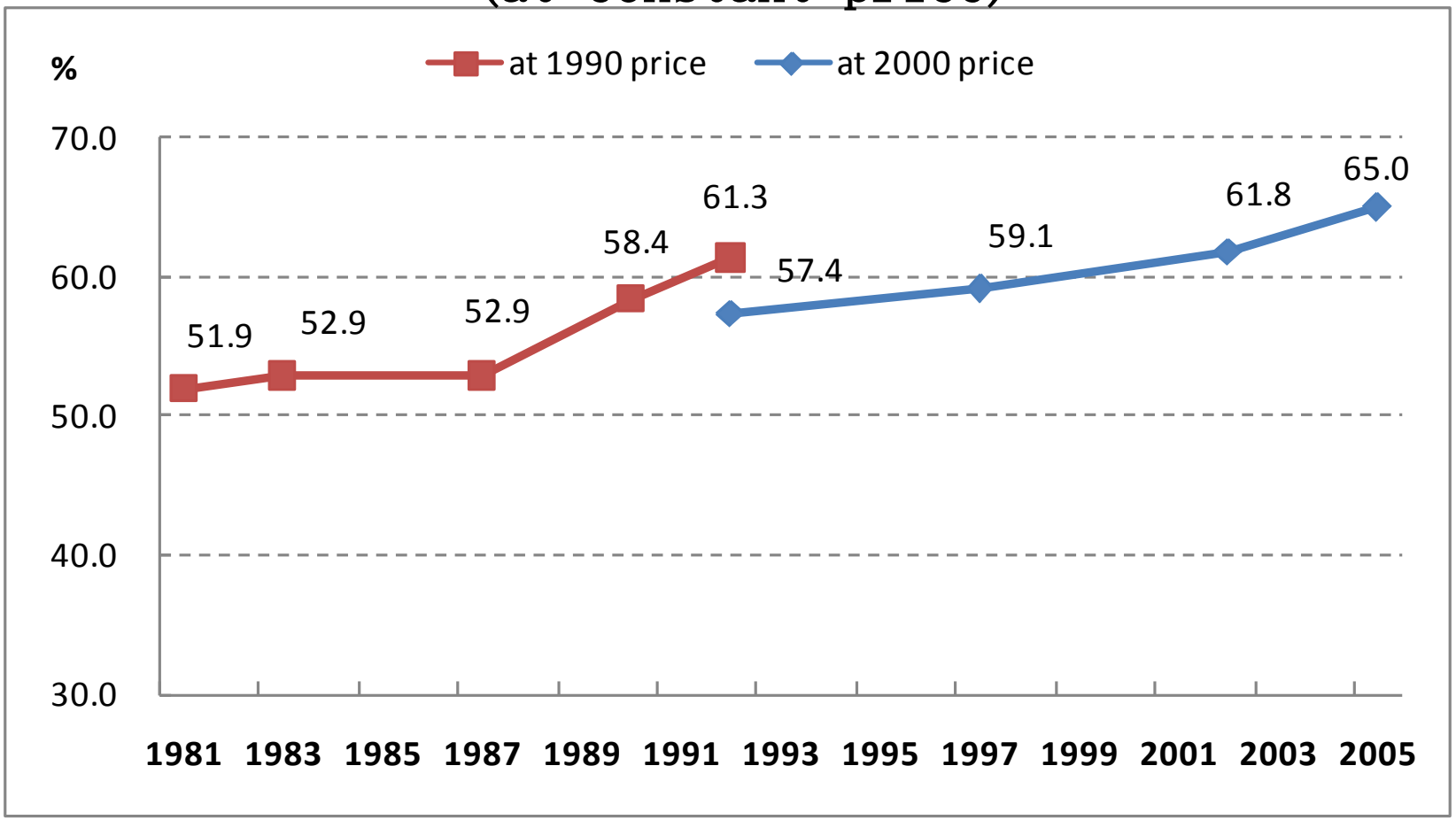
The intermediate input made the share of tertiary industry GDP decline by 8.3 percentage points from 1981 to 2005. Chenery (1986) pointed out that one of important factors in driving the industrialization is the increasing using of intermediate input.

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
effects of Intermediate input	-0.9	2.9	-3.0	-3.1	-1.1	-2.3	-0.8	-8.3

Share of Service Input in Total Intermediate Input (at constant price)



Share of Total Intermediate Input to Total Output (at constant price)



6. Government consumption was also a factor reducing the share of tertiary industry in GDP

Since the reform and open door policy was implemented in 1978, the government reduced its expenditures on some fields.

For example, the tuition for undergraduate is paid mainly by household instead of the government recently.

Te share of government consumption in GDP decreased from 16.1% in 1981 to 13.3% in 2005.

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Government consumption	-0.6	-0.6	-1.0	1.1	-1.1	-0.6	-0.5	-3.3

7. The change of Investment ratio to GDP reduced the share of tertiary industry, but the effect was small

	1981-1983	1983-1987	1987-1990	1990-1992	1992-1997	1997-2002	2002-2005	total
The change of tertiary industry share in GDP	0.4	7.2	2.0	3.2	-0.6	7.3	-1.4	18.1
……	…	…	…	…	…	…	…	…
Investment	0.1	-0.3	-0.1	0.1	0.1	-1.3	-0.4	-1.8

4. The decomposition Results for Korea (%)

		1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2005	2005-2007	total
The change of tertiary industry share in GDP		2.9	-0.9	0.7	3.6	6.8	1.6	1.2	**15.8**
Intermediate input		-2.9	-0.1	0.2	-0.2	4.1	-1.1	-0.3	**-0.2**
Household consumption	Consumption ratio in GDP	0.2	-0.1	0.0	0.2	-0.3	0.0	0.2	**0.2**
	Consumption structure	-0.3	2.6	-0.6	0.6	2.4	0.7	5.4	**5.4**
Government consumption		0.7	-1.4	-0.3	-0.6	-0.1	0.7	0.1	**-0.9**
Investment		1.0	-1.4	-1.9	-0.2	4.5	0.4	0.0	**2.4**
Net Export		-0.4	-1.1	1.0	-0.4	-1.7	-2.2	-0.3	**-5.0**
Price		4.8	0.3	2.4	4.5	-1.9	3.6	1.7	**15.4**
residual term		-0.2	-0.1	-0.1	-0.3	-0.8	-0.1	0.0	**-1.4**

The decompose results for South Korea:

1. Price was the main factor raising the proportion of the tertiary industry in GDP
2. Consumption structure was also an important factor in increasing the share of tertiary industry in South Korean
3. The ratio of consumption in GDP had small effect on the change of tertiary industry share.
4. Net export had the largest negative effect on the share of tertiary industry in GDP
5. Intermediate input、investment and government construction dropped the share of tertiary industry in most of time.

The Results Comparison Between China and South Korea

		CHINA 1981-2005	KOREA 1975-2007	CHINA	KOREA
The change of tertiary industry share in GDP		18.1	15.8		
Intermediate input		-8.3	-0.2		
Household consumption	Consumption ratio in GDP	0.3	0.2		
	Consumption structure	6.1	5.4	++	++
Government consumption		-3.3	-0.9		
Investment		-1.8	2.4		
Net Export		2.4	-5.0		
Price		22.1	15.4	+++	+++
residual term		0.7	-1.4		

in GDP and the government spending have similar effects

The Results Comparison Between China and Korea

on the share of tertiary industry in GDP both in China and Korea.

1) Price and consumption structure were the most important factors for increasing the share of tertiary industry.

2)The contribution of consumption share (include government and household consumption) in GDP to the share of tertiary industry was small both in China and Korea

The Results Comparison Between China and Korea

2. The role of intermediate input、investment and net import were different between China and Korea.

1) Intermediate input had the largest negative effects on the proportion of Chinese tertiary industry in GDP, however, its effect was small in South Korea.

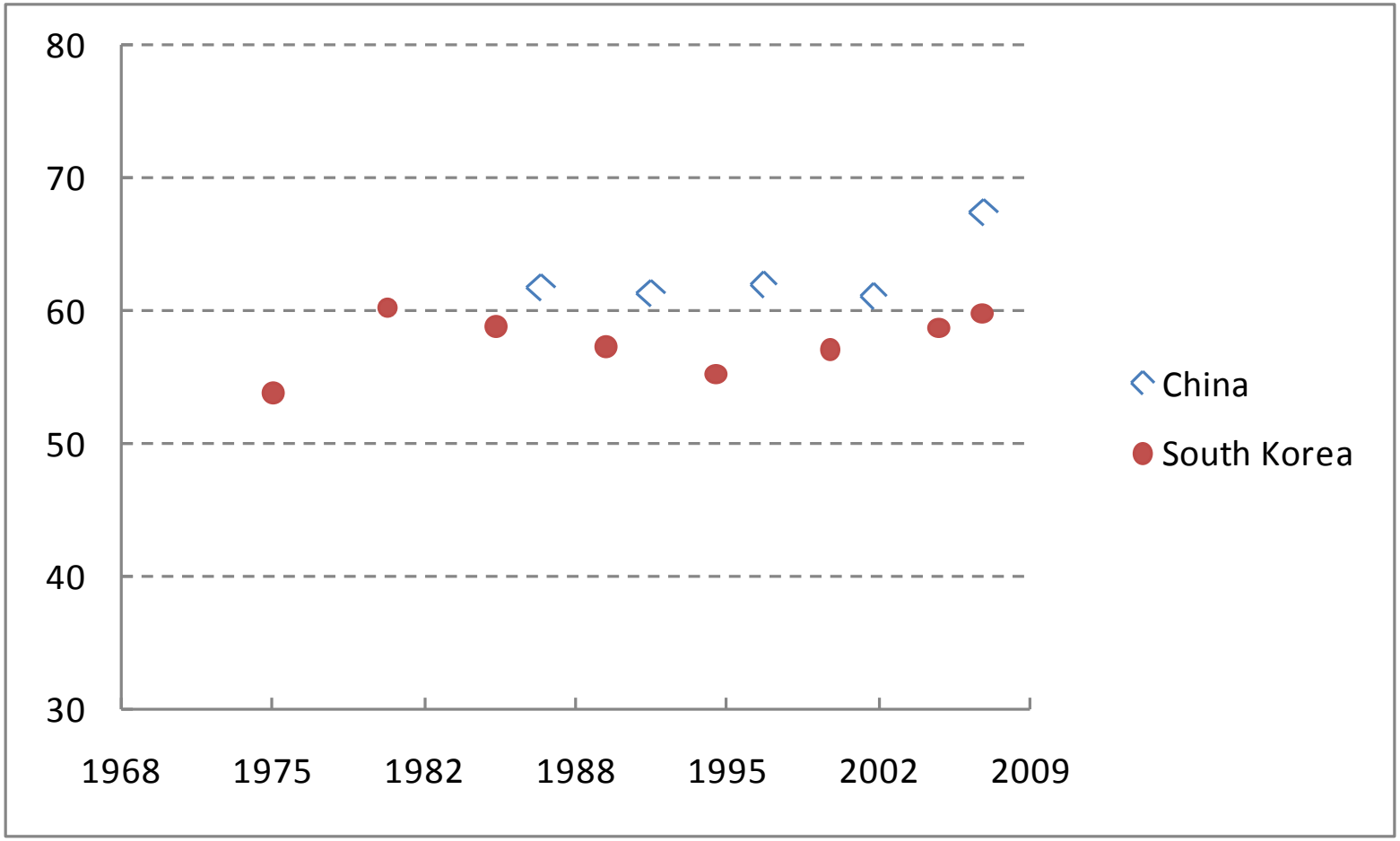
2) Investment decreased the share of tertiary industry in China but raised that in Korea

3) Net export also had opposite effects in China and Korea

5. Conclusion and Forecasting

- We suppose that the share of tertiary industry in GDP will be increased quickly in the twelfth five years plan period (2011-2015) and even longer time.
- Wage rise quickly in recent years and it will be raise continuously in the future, especially for some kind of labors.
- The household consumption structure will be upgrade . The share of service expenditure in total consumption in China was only 46% in 2005, while that share in Korea has reached 69.3%.
- The effect of intermediate input will become weak

Share of Total Intermediate Input to Total Output (at current price)



Thank you for your Attention!