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Structural Changes and Growth Factors of China's Textile Industry: 1997-2012

DOI: 10.5604/01.3001.0011.5734

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Abstract
In this study, the Input-Output Structural Decomposition Analysis (I-O SDA) method is adopted to analyze the structural change in China's textile industry during 1997-2012 and to measure the contribution rate of the growth factors (consumption, investment, inventory, exports and imports) affecting change in its gross output. Then the key factors and main driving forces promoting textile industry development are figured out. The results show that China's textile industry has experienced great change both in scale and structure. Among the growth factors, the contribution rate of exports is the largest, followed by investment, consumption, imports and inventory. The textile industry still relies heavily on exports, investment and consumption, while the contribution rate of imports is relatively small. In addition, technological change makes a positive contribution with technological innovation. Among the industrial sectors, the cotton & chemical fibre textile industry holds dominance, with the textile manufactured goods industry exhibiting tremendous development, the growth of the knitted textile industry fluctuating, and the wool textile industry and hemp & silk textile industry progressing slowly. Finally relevant policy suggestions are proposed to promote the balanced and coordinated development of China's textile industry.

Key words: *China's textile industry, structural change, growth factors, structural decomposition analysis.*

Introduction

China has the world's largest textile industry, with the international market share accounting for more than 30% with economic modernisation. Profound changes have taken place in the textile industry structure. Now the "One Belt and One Road" strategy provides a new opportunity for the textile industry. However, China's textile industry is encountering various problems, such as the rising cost of labour, land and raw materials, low value-added products, structural overcapacity etc. Faced with these realities, it is necessary to perform an in-depth analysis of its structural change and figure out the key factors influencing textile industry development.

Input-Output Structural Decomposition Analysis (IO-SDA hereinafter) is a comparative static method to analyse structural change. On the basis of the input-output identical equation, IO-SDA performs comparative analysis of the changes in certain I-O table variables in different periods. The change in the object analysed is decomposed into variations in several basic factors to trace back to the causes and to assess the effects of these basic factors.

IO-SDA is widely used to analyse the effects of technological and structural change on economic growth. Researchers have mainly applied IO-SDA to assess the economic structural change of a specific country. Feldman JF [1] studied the change in industrial gross output of the United States during 1963-1978 by analysing the decomposition of the 400-sectors I-O table. Syrquin [2] first proposed the method of using IO-SDA to analyse the relationship between economic change and growth factors. Then Takahiro A [3] & Jojo J [4], Chen XK [5], and Aying L [6] analysed the economic structural change and growth factors in Indonesia, China and South Africa, respectively, at the nation level.

With the expansion of the research scope, IO-SDA is developed to analyse change in the industrial structure. Richard P [7] applied IO-SDA to analyse structural changes and market growth of the food industry in the UK, EU and US. Chinkook L [8] analysed the economic growth and structural change in the American food and fibre industry during 1972-1982. Fujikawa K [9] studied the price gap between Chinese and Japanese industrial sectors with the IO-SDA method. And Jae PH [10] investigated structural changes and growth factors of Korea's ICT industry during 1995-2009. Now the application of IO-SDA has been gradually extended to the fields of energy, employment and so on. In the energy field, the research results are mainly at the national level. Rose A [11] applied SDA to analyse the changes and factors in energy consumption in the United States during 1972-1982. Wier [12] studied gas emissions in the whole territory of Denmark caused by energy consumption. Debesh C [13] analysed the changes and key factors in energy consumption during India's reform period. Fang B [14] discussed the driving forces of China's energy consumption. In the employment field, Han X [15] studied Japan's economic structural change and its impact on labour demand. Koller W [16] investigated Australia's trade integration, exports and their impacts on employment.

The development of China's textile industry has attracted the widespread attentions of scholars. Academic circles have carried out numerous researches on it and achieved fruitful results. But there is only little research with the I-O method, and research results are especially rare [17-18]. The existing literature on China's textile industry structure are mainly descriptive summaries, lacking in-depth theoretical and empirical research. And there is no research carried out by the I-O SDA method either.

In consideration of the significance of studying structural change and growth factors in China's textile industry and filling the gap in this research field, this study applies the I-O SDA method to analyse the structural change in China's textile industry during 1997-2012 and to measure the contribution rate of growth factors affecting change in its gross output for the first time. This study changes the simple division of the final demand into consumption, investment, inventory and net imports as given in previous literature. Final demand is divided into rural household consumption, urban household consumption, government consumption, gross fixed capital formation, inventory change, exports and imports in this paper. Thus it also can provide useful empirical support for industrial structure adjustment and future development.

This paper is structured as follows. Section 2 introduces the IO-SDA method in detail, the scope of China's textile industry and the sector classification adopted in this paper. Section 3 analyses the change in the gross output of China's textile industry during 1997-2012. Section 4 assesses the contribution rate of the growth factors affecting the gross output of China's textile industry. Section 5 provides a summary and several policy suggestions.

Methodology and data source

Methodology

There are three IO-SDA models widely used: the Syrquin model, GDP structural decomposition model and RAS structural decomposition model. Their difference is the form of fixed factors based on different analysis ideas. The Syrquin model sets one factor in the base period and the other one in the reporting period, which has the disadvantage of a non-unique base period. The GDP structural decomposition model sets all the factors in the base period to solve this problem. However, there exist cross terms in the model, which lead to deviation of the analysis result. And researchers have not reached an agreement on the interpretation of the cross terms either. The RAS structural decomposition model sets all the factors in the mid-point of the base period and the reporting period, as well as in other weighted forms. The advantage is the unique result and that there is no interference of the cross terms, which benefits application of the nested model.

After comparing the three IO-SDA models above, an RAS structural decomposition model is chosen to analyse structural change in China's textile industry and to measure the contribution rate of growth factors.

As we know, the relationship between the gross output (X) and final demand (F) of the I-O table is as follows:

$$X = (I - A)^{-1}F \qquad (1)$$

In ***Equation (1)***, A represents the direct consumption coefficient. In the China I-O table, F consists of rural household consumption (N), urban household consumption (C), government consumption (Z), gross fixed capital formation (G), inventory change (S), exports (E) and imports (M). Due to the large statistical error (W), its influence cannot be ignored. Hence this study takes it into account the analytical factor of final demand and assesses its effect on the change in gross output. As $F = N + C + Z + G + S + E + M + W$ and the total demand coefficient $B = (I - A)^{-1}$, it can be deduced that:

$$X = BF \qquad (2)$$

which leads to ***Equation (3)*** with the RAS structural decomposition model:

$$\Delta X = \frac{1}{2}(\Delta B)(F_0 + F_1) + \frac{1}{2}(B_0 + B_1)\Delta F \qquad (3)$$

The first term on the right side of ***Equation (3)*** represents the effect of technological change on gross output change when the final demand is constant. The second term represents the effect of the final demand on the gross output change when the technological change is constant.

ΔB in the first term on the right side of ***Equation (3)*** can be further decomposed into the change in the direct consumption coefficient (A) with the nested formula deduced by Dietzenbacher E [19]. The result can be expressed as:

$$\Delta B = \frac{1}{2}B_0(\Delta A)B_1 + \frac{1}{2}B_1(\Delta A)B_0 \qquad (4)$$

The change in the direct consumption coefficient ΔA can be decomposed into three parts: column vector change, row vector change and specific unit change. The column vector change indicates the change in intermediate input intensity. For example, technical innovation will reduce the quantity of intermediate input in the same proportion. Row vector change represents the average substitution effect of intermediate input, such as the substitution of cotton type chemical fibre for cotton in the spinning industry. Specific unit change includes all the other changes that cannot be explained by the row vector change and column vector change.

The direct consumption coefficient A is transformed as follows:

$$A_1 = \hat{R}A_0\hat{S} \qquad (5)$$

In ***Equation (5)*** $\hat{R}$ represents the diagonal matrix of the multiplier, and $\hat{S}$ the diagonal matrix of the column multipliers.

$$\hat{S} = \begin{cases} 0 & i \neq j \\ \dfrac{\sum_{l=1}^{n} a_{lj}^{1}}{\sum_{l=1}^{n} a_{lj}^{0}} & i = j \end{cases} \qquad (6)$$

In ***Equation (6)***, a_{lj}^{1} and a_{lj}^{0} represent elements of row j column l in the direct consumption coefficient matrix in the reporting period and base period, and n the number of I-O table sectors.

$$R = A_1(A_0\hat{S})^{-1} \qquad (7)$$

which leads to ***Equation (8)***,

$$\Delta A = A_1 - A_0 = RA_0\hat{S} - A_0 = \frac{1}{2}(R - I)$$
$$A_0(\hat{S} + I) + \frac{1}{2}(R + I)A_0(\hat{S} - I) \qquad (8)$$

The formula of the RAS structural decomposition model can be obtained from the above formulas:

$$\Delta X = \frac{1}{8}\big[B_0(R - I)A_0(\hat{S} + I)B_1 +$$
$$+ B_1(R - I)A_0(\hat{S} + I)B_0\big](F_0 + F_1) +$$
$$+ \frac{1}{8}\big[B_0(R + I)A_0(\hat{S} - I)B_1 +$$
$$+ B_1(R + I)A_0(\hat{S} - I)B_0\big](F_0 + F_1) +$$
$$+ \frac{1}{2}(B_0 + B_1)(\Delta N + \Delta C + \Delta Z + \Delta G +$$
$$+ \Delta S + \Delta E + \Delta M + \Delta W) \qquad (9)$$

Equation (9) is the structural decomposition model of the change in gross output. When the change in gross output is divided by that in the growth factors, the structural decomposition model of the contribution rate is obtained as follows:

$\frac{1}{2}(\mathrm{diag}(X_0))^{-1}(\Delta B)(F_0 + F_1)$ — contribution rate of technological change.

$\frac{1}{8}(\mathrm{diag}(X_0))^{-1}\big[B_0(R - I)A_0(\hat{S} + I)B_1 + B_1(R - I)A_0(\hat{S} + I)B_0\big](F_0 + F_1)$ — contribution rate of average substitution effect.

$\frac{1}{8}(\mathrm{diag}(X_0))^{-1}\big[B_0(R + I)A_0(\hat{S} - I)B_1 + B_1(R + I)A_0(\hat{S} - I)B_0\big](F_0 + F_1)$ — contribution rate of intermediate input intensity.

$\frac{1}{2}(\mathrm{diag}(X_0))^{-1}(B_0 + B_1)\Delta F$ — contribution rate of final demand.

$\frac{1}{2}(\mathrm{diag}(X_0))^{-1}(B_0 + B_1)(\Delta N + \Delta C + \Delta Z + \Delta G + \Delta S + \Delta E + \Delta M + \Delta W)$ — contribution rate of rural household consumption, urban household consumption,

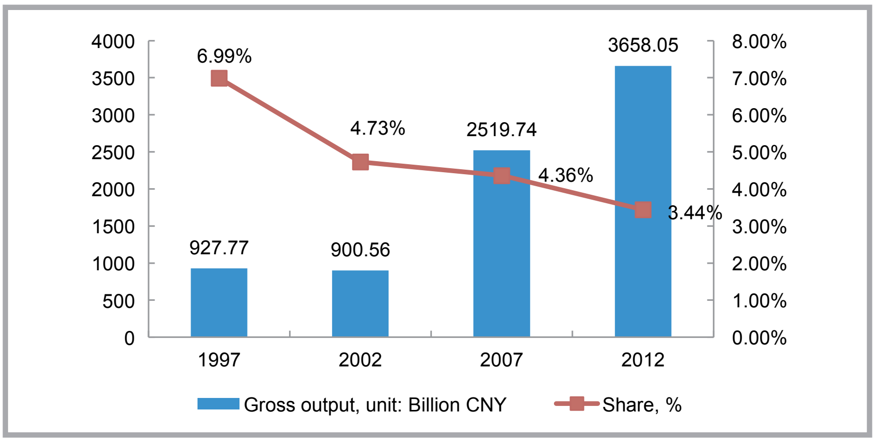

Figure 1. *Gross output of China's textile industry and its share in the manufacturing industry during 1997-2012.*

government consumption, gross fixed capital formation, inventory change, exports, imports, and statistical error, respectively.

Data source

As the industry classification standard of the I-O table is different from that of the national economy and the I-O tables are not totally the same as each other during 1997-2012, sectors of the I-O tables need adjustment and standardisation to adapt to the mathematical model applied in this paper. The adjusted sector classification is as follows (***Table 1***). Moreover the data are obtained from the Input-output table of China for 1997, 2002, 2007 and 2012, as released by the National Bureau of Statistics. (The 2017 I-O table may be released in 2020, according to publishing practice).

Structural changes in gross output

China's textile industry experienced great change both in scale and structure during 1997-2012. The gross output decreased from 927.77 billion CNY in 1997 to 900.56 billion CNY in 2002. Then it gradually increased to 2519.74 billion CNY in 2007 and 3658.05 billion CNY in 2012. The growth rates were -2.94%, 180% and 45.2%, respectively. The share of the textile industry in the manufacturing industry declined from 6.99% in 1997 to 3.44% in 2012, distinct from the trend of gross output (***Figure 1***). This shows that the status of the textile industry declined in the national economy as a traditional industry, and that textile industry development was significantly surpassed by manufacturing industry during this period.

Table 1. *Adjusted textile sector classification of China.*

Sector	Scope
Cotton &Chemical (Cotton &chemical fibre textile industry)	Cotton textile, dyeing &printing industry Chemical fibre textile, dyeing &printing industry
Wool (Wool textile industry)	Wool textile, dyeing &printing industry
Hemp &Silk (Hemp &silk textile industry)	Hemp textile, dyeing &printing industry Silk textile, dyeing &printing industry
Manufactured (Textile manufactured goods industry)	Household textile manufactured goods industry Industrial textile manufactured goods industry
Knitted (Knitted textile industry)	Knitted textile industry

Table 2. *Gross output, share and CAGR of China's textile sectors during 1997-2012.* ***Note:*** *CAGR is short for compound annual growth rate and the unit of output is billion CNY.*

Sector	1997		2002		2007		2012		CAGR
	Output	Share	Output	Share	Output	Share	Output	Share	(%)
Cotton &Chemical	407.86	3.07%	447.83	2.35%	1277.96	2.21%	2516.16	2.36%	12.90
Wool	131.10	0.99%	79.39	0.42%	174.53	0.30%	247.94	0.23%	4.34
Hemp &Silk	165.00	1.24%	95.26	0.50%	205.51	0.36%	190.15	0.18%	0.95
Manufactured	101.09	0.76%	85.69	0.45%	341.18	0.59%	403.39	0.38%	9.67
Knitted	122.71	0.92%	192.38	1.01%	520.55	0.90%	300.40	0.28%	6.15
Total	927.77	6.99%	900.56	4.73%	2519.74	4.36%	3658.05	3.44%	9.58

Table 2 shows the gross output, share and CAGR of China's textile sectors during 1997-2012 in detail. The gross output of every sector varied during this period. The gross output of the cotton & chemical fibre textile industry increased from 407.86 billion CNY in 1997 to 2516.16 billion CNY in 2012, which brought an increase of more than 5 times in 15 years. What is more, its gross output, share and CAGR ranked No.1 among all the sectors of China's textile industry. Its share accounted for 49.73%, nearly half of the textile industry, in 2002 for the first time and reached 68.78% in 2012, being more than 2/3. All of these indicators demonstrated its dominant position in the textile industry.

The gross output of the textile manufactured goods industry increased by 3 times, and its CAGR was 9.67%. Both of them ranked second in all sectors, showing a rapid development momentum. On the contrary, the share of the hemp &silk textile industry declined from 1.24%, the 2nd, in 1997 to 0.18%, the 5th, in 2012, with its CAGR being only 0.95%. The share of the wool textile industry ranked 3rd in 1997, but declined gradually to 4th in 2012, accounting for only 0.23%. This also revealed the declining situation of these natural fibre manufacturing industries under the new circumstance. On the other hand, the gross output of the knitted textile industry gradually increased from the 4th in 1997 to 3rd in 2012, and its CAGR was 6.15%, which exhibited a higher development level.

Contribution rate of growth factors

With the I-O SDA method, the contribution rates of growth factors in China's textile industry during 1997-2012 are measured in this study. The results are as follows.

Technological change

It can be seen that the contribution rate of technological change to that in gross output was negative, where the cumulative contribution rate was -40.01% during

1997-2002, showing that China's textile industry experienced tremendous technological change and technological innovation. Reform of industry structure and the elimination of backward production capacity provided a better explanation for this phenomenon. Its contribution rate was positive – 16.17% to 3.24% – during 2002-2012, owing to the gradual replacement of old equipment. The average substitution effect made the greatest negative contribution rate of -37.42% during 1997-2002. However, the contribution rate of 2.21% during 2007-2012 indicated that average substitution effect began to make a positive contribution to China's textile industry. The contribution rate of intermediate input intensity reached the greatest positive value of 24.53% during 2002-2007, as the textile industry actively expanded the production scale to satisfy the strong market demand during this period (***Table 3***).

Table 3. Contribution rate (%) of technological change to that in gross output.

Sector	Average substitution effect			Intermediate input intensity			Technological change		
	97-02	02-07	07-12	97-02	02-07	07-12	97-02	02-07	07-12
Cotton &Chemical	-9.10	-6.76	13.69	-1.35	15.86	0.63	-10.44	9.10	14.32
Wool	-8.36	-2.91	-1.81	-0.51	2.41	0.20	-8.87	-0.50	-1.61
Hemp &Silk	-12.12	-0.30	-5.52	-0.28	2.78	0.04	-12.40	2.48	-5.49
Manufactured	-9.57	4.65	-7.33	-0.39	2.26	0.06	-9.95	6.92	-7.27
Knitted	1.72	-3.03	3.18	-0.06	1.21	0.10	1.66	-1.82	3.28
Total	-37.42	-8.35	2.21	-2.59	24.53	1.03	-40.01	16.17	3.24

Table 4. Contribution rate (%) of final demand to change in gross output.

Sector	Consumption			Gross fixed capital formation			Inventory change		
	97-02	02-07	07-12	97-02	02-07	07-12	97-02	02-07	07-12
Cotton &Chemical	8.52	13.42	14.93	7.89	23.89	21.94	-3.88	3.17	0.69
Wool	1.09	1.71	1.91	2.14	4.25	2.74	-0.96	0.32	0.21
Hemp &Silk	3.00	1.46	1.85	2.51	4.76	2.86	-1.35	0.74	-0.09
Manufactured	3.09	2.98	3.87	2.01	4.50	2.89	-0.71	0.23	0.18
Knitted	0.32	0.91	1.52	0.53	2.11	1.76	-0.50	-0.03	0.29
Total	16.03	20.48	24.08	15.08	39.51	32.18	-7.39	4.43	1.28

Table 5. Contribution rate (%) of consumption to change in the gross output.

Sector	Rural household consumption			Urban household consumption			Government consumption		
	97-02	02-07	07-12	97-02	02-07	07-12	97-02	02-07	07-12
Cotton &Chemical	-1.67	1.55	2.72	7.45	8.34	9.69	2.73	3.53	2.53
Wool	-0.86	0.34	0.34	1.40	0.90	1.24	0.56	0.47	0.33
Hemp &Silk	-0.08	0.09	0.33	2.37	0.79	1.16	0.71	0.58	0.37
Manufactured	0.21	0.44	0.89	2.37	1.91	2.45	0.51	0.62	0.53
Knitted	-0.74	0.11	0.31	0.90	0.58	1.01	0.15	0.23	0.20
Total	-3.13	2.52	4.59	14.50	12.52	15.54	4.66	5.44	3.95

Among the industrial sectors, the average substitution effect during 2002-2012 and intermediate input intensity during 1997-2012 of the cotton & chemical fibre textile industry both offered the greatest contribution rate. Especially the average substitution effect brought a contribution rate of 13.69% during 2002-2012 and intermediate input intensity gave a contribution rate of 15.86% during 2002-2007. They were much higher than those of other industrial sectors, fully denoting that its technological change had a great impact on the gross output of the textile industry. The intermediate input intensity of the hemp & silk textile industry gave the greatest negative contribution rate -12.12% of the sectors during 1997-2002, which meant that it suffered much from the limitation of production capability and the elimination of backward production capacity during this period.

Final demand

Final demand made a great contribution to the change in gross output, indicating that increasing final demand greatly enhanced the gross output growth. Among the three growth factors analysed in this part, the contribution rate of gross fixed capital formation was the largest, followed by consumption and inventory change, which showed that the textile industry relied heavily on investment and consumption. The contribution rate of gross fixed capital formation first increased and then decreased, reaching a maximum of 39.51% during 2002-2007. It fully illustrated the importance of investment to textile industry development. The contribution rate of consumption soared from 16.03% to 24.08%, which demonstrated that the consumption had made more and more contribution. This phenomenon agreed with the policy of stimulating consumption to expand the gross output. And the contribution rate of inventory change always remained at a low level (***Table 4***).

Among the industrial sectors, the cotton & chemical fibre textile industry made the greatest contribution, and its proportion always accounted for more than 50%. Even the contribution rate of its inventory change reached 71.59% during 2002-2007, which also demonstrated its dominant position in the textile industry. The contribution rate of the textile manufactured goods industry remained the second, denoting its great development potential. The contribution rates of the wool textile industry and hemp &silk textile industry ranked the 3rd and 4th, respectively, and the knitted textile industry was at the bottom among the sectors, showing that these three sectors had made little contribution to the growth of the textile industry.

Consumption

As mentioned above, the contribution rate of consumption soared from 16.03% to 24.08% during 1997-2002. This indicated that consumption played a positive and increasing role in enhancing gross output growth. The contribution rate of rural household consumption increased from 2.52% to 4.59%, which illustrated the rising consumption demand of rural residents. The contribution rate of urban household consumption accounted for more than half of the proportion, demonstrating the important role of urban household consumption in the consumption structure. The contribution rate of government consumption fluctuated at 5%, which meant that government consumption demand was relatively stable (***Table 5***).

Table 6. Contribution rate (%) of exports and imports to change in the gross output.

Sector	Exports			Imports		
	97-02	02-07	07-12	97-02	02-07	07-12
Cotton &Chemical	13.00	62.71	0.75	-12.79	-11.30	-8.78
Wool	2.27	8.83	-0.14	-1.40	-2.69	-0.92
Hemp &Silk	2.05	8.43	0.57	-1.82	-3.60	-1.08
Manufactured	4.38	19.22	3.45	-0.10	-4.16	-1.28
Knitted	5.67	40.33	-16.61	-0.86	-1.63	-0.30
Total	27.38	139.53	-11.97	-16.97	-23.39	-12.35

Table 7. Contribution rate (%) of statistical error to the change in gross output.

Sector	Statistical error		
	97-02	02-07	07-12
Cotton &Chemical	2.02	-8.8	5.26
Wool	0.14	-1.35	0.73
Hemp &Silk	0.48	-2.03	0.76
Manufactured	-0.38	-1.34	0.64
Knitted	0.68	-3.41	1.33
Total	2.94	-16.93	8.72

Among the industrial sectors, the contribution rate of the cotton & chemical fibre textile industry was in the first place and its proportion was more than 50% all the time, showing that the social demand for cotton &chemical textile products was the most important. The textile manufactured goods industry made the second greatest contribution generally, owing to the growing demand for home textiles and industrial textiles. The contribution rates of the wool textile industry and hemp & silk textile industry ranked 3rd and the 4th, respectively, and the knitted textile industry was at the bottom among the sectors, because of their relatively small industrial scale, which indicated that the development of these natural fibre manufacturing industries slowed down and that the knitted textile industry also encountered some problems.

Exports and imports

Exports, consumption and investment have comprised the three driving forces of China's economic development all along. As an export-oriented industry, China's textile industry also relies heavily on exports to promote gross output growth. The contribution rate of exports was the largest among all the factors of final demand, which means that exports were the most significant factor in driving the development of China's textile industry. It can be seen from ***Table 6*** that the contribution rates of exports and imports increased at first and then decreased during 1997-2012. While faced with unfavorable circumstances, such as the reform of industrial structure and elimination of backward production capacity, exports still brought a contribution rate of 27.38% during 1997-2002. The greatest contribution rate of 139.53% during 2002-2007 mainly owed to the abolition of the Multifibre Agreement and the cancelling of quota limits on Chinese textiles in the main textile import countries. Consequently it led to a giant leap in China's textile exports. During 2007-2012, the contribution rate of -11.97% denoted the severe export situation of China's textile industry, and also showed that the huge fluctuation of exports had an adverse effect on its smooth development. One of the reasons was that the international financial crisis in 2008 led to a reduction in foreign demand for Chinese textiles, and another was the higher trade barrier to China's textiles placed by the main textile import countries. Moreover the higher RMB exchange rate also weakened the export competitiveness of Chinese textile products. The contribution rate of imports remained at a relatively low level compared with exports, indicating that imports had a relatively small impact on the textile industry. Furthermore it also indirectly proved the status of China as a textile export superpower.

Among the industrial sectors, the export contribution rate of the cotton & chemical fibre textile industry remained in the first place, accounting for about 50% during 1997-2007. But there was a sharp drop from 62.71% of 0.75% during 2007-2012. In addition to the reasons above, sliding duty led to a slump in the prices of domestic and foreign cotton, which also weakened the export competitiveness of Chinese cotton textile products. The import contribution rate of the cotton &chemical fibre textile industry was also in first place, and the highest proportion was more than 75%, which highlighted the important role of its imports. The exports contribution rate of the textile manufactured goods industry ranked from 3rd during 1997-2007 to 1st during 2007-2012, and its import contribution rate ranked from 4th to 2nd, indicating strong momentum and great development potential. These notable achievements mainly owed to the increasing demand for home textiles and industrial textiles. The contribution rates of the wool textile industry and hemp &silk textile industry ranked 3rd and 4th, respectively, and were consistent with their industrial scales. The export contribution rate of the knitted textile industry sharply dropped from 2nd during1997-2007 to 5th during 2007-2012, bringing the greatest negative contribution rate of -16.61%, the reason for which being related to the sharp decrease in its gross output during this period. As it might lead to a decrease in exports, it influenced the export contribution rate.

Statistical error

Overall the change in the statistical error shared the same trend as for gross output, which first increased and then decreased during 1997-2012. Moreover the statistical error had the largest influence of -16.93% during 2002-2007 (***Table 7***).

Among the industrial sectors, the cotton & chemical fibre textile industry owned the largest gross output, and hence its statistical error was also the largest. The influences of the knitted textile industry, hemp & silk textile industry and wool textile industry ranked 2nd, 3rd and 4th, respectively. With the rapid development, statistical information on the textile manufactured goods industry was more complete and reliable, and its statistical error was the least of all. Through analysis of the statistical error, it forces us to pay more attention to statistical error control.

Conslusions

The RAS model of IO-SDA is applied to analyse the structural change in China's textile industry during 1997-2012 and to measure the contribution rate of growth factors affecting change in its gross output in this study. Then the key factors and main driving forces enhancing China's textile industry development are figured out. Finally relevant policy suggestions are proposed.

China's textile industry experienced great change both in scale and structure during 1997-2012. The gross output of the textile industry increased by 294%, but its share in the manufacturing industry declined from 6.99% to 3.44%. Textile industry development was significantly surpassed by the manufacturing industry, and the status of the textile industry declined in the national economy during this period.

Among the growth factors, the contribution rate of exports was the largest, followed by investment, consumption, imports and inventory. China's textile industry still relied heavily on exports, investment and consumption. The contribution rate of exports peaked at 139.53% during 2002-2007, illustrating its great influence on the textile industry. The relatively small contribution rate of imports indirectly proved the status of China's textile export superpower. Consumption had made increasing contribution to the change of gross output and urban household consumption made the largest contribution in consumption structure. Increasing final demand could greatly promote the gross output growth.

Among the industrial sectors, the cotton &chemical fibre textile industry firmly occupied the dominant position in the textile industry. Its gross output share was more than 2/3 and its contribution proportion was generally over 50%. Furthermore more than half of its contribution was made by exports, investment and consumption. With the rapid development of the home textile industry and nonwoven industry, the industrial scale and contribution rate of the textile manufactured goods industry were mext to the cotton & chemical fibre textile industry. The scale of the knitted textile industry fluctuated greatly, mainly because of the sharp decline in exports. The growth rates of the wool textile industry and hemp &silk textile industry were much lower than for other sectors, and the proportion shrank constantly. Now there emerges the situation that the cotton &chemical fibre textile industry takes dominance, with the textile manufactured goods industry exhibiting the tremendous development; however, the growth of the knitted textile industry fluctuates, and the wool textile industry and hemp &silk textile industry progress slowly.

According to the analysis above and the current situation of China's textile industry, China should insist on promoting exports of textiles, optimising the investment layout of the textile industry, actively expanding domestic consumption, stimulating urban household consumption, and developing the potential of rural household consumption. Faced with the "Supply-side Structural Reform" policy, China should also encourage textile enterprises to update production technology and the management mode to produce more high-quality textile products. At the same time, China should pay more attention to optimising the industrial structure, promoting exports and consumption of products from the cotton &chemical fibre textile industry, encouraging the development of the textile manufactured goods industry, suppressing large fluctuations of the knitted textile industry and regulating the scale of the wool textile industry and hemp &silk textile industry. In this way, the balanced and coordinated development of China's textile industry will be finally realised.

Limitations and extensions

The data used in this study are from the Input-output table of China in 1997, 2002, 2007 and 2012, released by the National Bureau of Statistics. The data of 2017 could not be obtained, as it will be released in 2020, according to publishing practice.

When the data of the 2017 I-O table are available, it will help us analyse the situation of China's textile industry more accurately. And it can also reveal more information about the textile industry. This part of the work will be done in the future.

Acknowledgements

This work was supported by the National Key R&D Program of China (2017YFB0309100).

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Received 29.09.2016   Reviewed 22.11.2017