The Relationship between Trade Commodity Structure and Industrial Structure in Fujian province

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Abstract. By using the data from 1999 to 2013, this paper studies the relationship between foreign trade commodity structure and industrial structure of Fujian province. Our empirical research firstly showed that there is long-term stable relationship between export, import commodity structure and industrial structure. Secondly, our research finds that the industrial structure and import commodity structure are Granger reason to each other while the industrial structure and export structure does not have this correlation.

Keywords: Trade commodity structure; industrial structure; co-integration; granger causality test.

1. Introduction

1.1 The Change of Export Commodity Structure.

Based on the Harmonized System, the export and import goods are clarified as manufactured goods and primary goods. It is widely believed that the primary goods are relatively low value-added goods and have relative low competitiveness while the high value-added goods are summarized as manufactured goods. And as a result, the share of manufactured goods in total export are widely used as an index to measure the competitiveness of trade for a specific region.

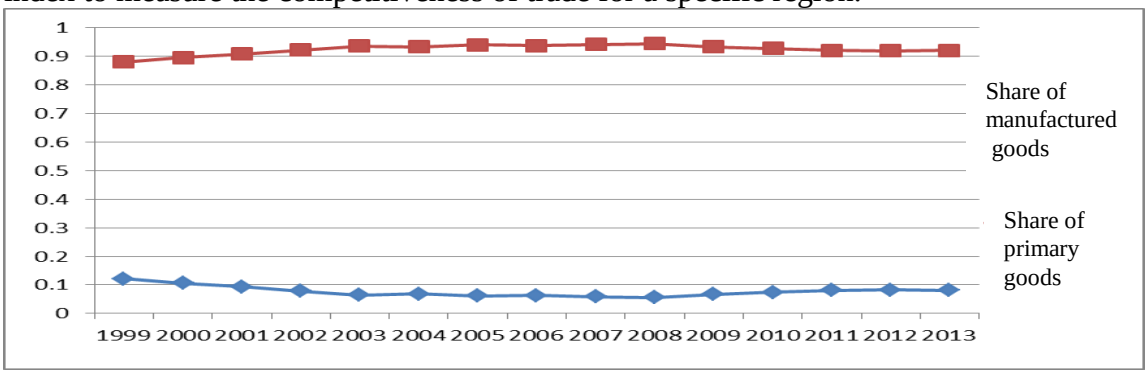

Fig. 1 the change of the export commodity from 1999-2013

As we can see from Fig. 1, it is worthwhile to note that there are two import features for the export of Fujian province. Firstly, the primary goods in total export and import volume takes only a small percentage at the end of twenty century, accounting about 12.14%. The share decreased slowly to the level of 5.68% till the end of 2008 while increased to the level of 8% in 2013. To the contrary, the share of manufactured goods has always played the dominant role in export goods in Fujian during the sample period. Its share was as high as 87.86% in 1999 and this Fig. increased slightly to the level of 91.94% in 2013.

1.2 The Change of Import Commodity Structure.

Compared to the situation of commodity export of Fujian province shown in Fig. 1, Fig. 2 shows the changing structure of commodity import of Fujian province during 1999 to 2013. From Fig. 3, we can see that the import of manufactured goods plays less and less important role in the total import volume, decreasing from 86.54% in 1999 to 55.46% in 2013. More specifically, among manufactured goods, the most important import goods are electronic machines and applicants, accounted for about 15% of total import, while on the other hand, the import of science machine and other equipment increased from 85.27 million to 555.05 million in 2013, increasing from its share of 1.36% in 1999 to 15.29% in 2013. All this change implies that the import commodity structure are in the path of improvement.

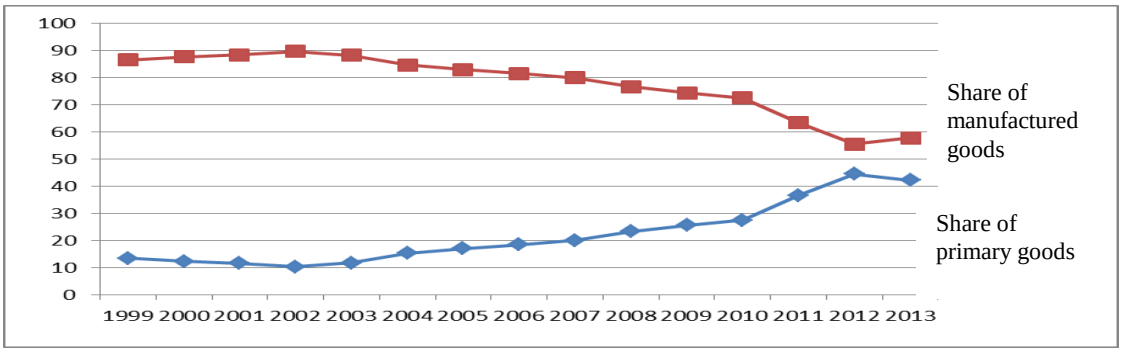

Fig. 2 the change of the import commodity from 1999-2013

2. The Index Construction and the ADF Test

2.1 The Index Construction.

Following the method constructed by Lan and Tian (2008), we use the following index to measure the change in industrial structure:

$$indstrchg = \sum_{i=1}^{n} \frac{dY_i}{Y_i}\left[\left(\frac{Y_i}{Y}\right)_t - \left(\frac{Y_i}{Y}\right)_{t-1}\right], \tag{1}$$

where i represents the sector of industrial and $\Delta Y_{i,t} / Y_{i,t-1}$ the growth rate of i industry in year t. And $\left(Y_i / Y\right)_t$ represents the share of i industry in the total output of whole province in year t. Accordingly, the change of import commodity strucutre and export commodity structure can be indexed as

$$impstrchg \equiv \sum_{i=1}^{n} \frac{\Delta IM_{i,t}}{IM_{i,t-1}}\left[\left(\frac{IM_i}{IM}\right)_t - \left(\frac{IM_i}{IM}\right)_{t-1}\right], \tag{2}$$

$$expstrchg = \sum_{i=1}^{n} \frac{\Delta X_{i,t}}{X_{i,t-1}}\left[\left(\frac{X_i}{X}\right)_t - \left(\frac{X_i}{X}\right)_{t-1}\right], \tag{3}$$

where $\Delta IM_{i,t} / IM_{i,t-1}$ represents the growth rate of import for of i industry in year t, $\Delta X_{i,t} / X_{i,t-1}$ represents the growth rate of total export of i industry in year t. Similarly, $\left(IM_i / IM\right)_t$ represent the share of i industry import in total import in year t, and $\left(X_i / X\right)_t$ represent the share of i industry export in total export in year t.

The data for the calculation of export commodity and import commodity are obtained by using the database of World Bank Online, and the base year is converted to the year 1999. And the export and import volume are calculated in US dollars and the data are from the Fujian Statistic Yearbook for specific years. Furthermore, the data for the production index of three industries are obtained from the Fujian Statistic Yearbook 2014 and the production is converted in index number based on the volume in year 1999.

2.2 The ADF Test.

In order to test the sequence stability of export commodity and import commodity structure, it firstly requires the stability test before any empirical test should be done. Following the process suggested by Sun and Wang (2013), we apply the ADF test and the following Table 1 summarizes the results.

From Table 1, we can see that under the critical value of 5%, import commodity structure reject the null hypothesis, which means that it is a stable sequence. However, both the export commodity structure and industrial structure accept null hypothesis, meaning that it is an unstable sequence.

Table 1 the ADF test for the commodity and industrial structure of Fujian province

variable	ADF value	5% critical value	Test method(c,t,n)	Lag period	Conclusion
indstrchg	0.32	-3.12	c	4	unstable
expstrchg	-1.48	-1.97	n	1	unstable
impstrchg	-1.98	-1.97	n	1	stable
△indstrchg	-5.39	-1.97	n	1	stable
△expstrchg	-2.62	-1.97	n	1	stable
△impstrchg	-4.28	1.97	n	1	stable

Note: C represents the constant parameter, and △ represents the first order difference.

3. The Relation between Export Commodity Structure and Industrial Structure

We construct the following regression equation:

indstrchg=0.000561+0.285998*expstrchg (4)

(2.41)

From this equation, we can do the co-integration test, whose results are summrzied in the Table 2.

Table 2 the co-integration test between export commodity and industrial structure

variable	ADF value	1% critical value	5% critical value	10% critical value	Test method(c,t,n)	Lag period	conclusion
u1	-3.22	-2.75	-1.97	-1.60	n	0	Stable

From Table 2, we can tell that there is a corelation between export commodity structure and industrial structure. The parameter and coefficient value is 0.285998, meaning that there is a positive relationship among dependent and independent variables. The existence of co-integration relationship shows that we in the next need to conduct the casuality test.

Table 3: the Granger causality test between export commodity structure and industrial structure

	F Statistic value	Probability	Lag period
expstrchg is the Granger reason of indstrchg	0.25	0.63	1
indstrchg is the the Granger reason of expstrchg	0.02	0.88	1
expstrchg is the Granger reason of indstrchg	0.23	0.80	2
indstrch is the Granger reason of expstrchg	0.03	0.97	2
expstrchg is not the Granger reason of indstrchg	0.30	0.82	3
indstrchg is not the Granger reason of expstrchg	0.57	0.65	3
expstrchg is not the Granger reason of indstrchg	0.24	0.90	4
indstrchg is not the Granger reason of expstrchg	2.33	0.32	4

From Table 3, we can see that the Granger causality test of export commodity structure and industrial structure all reject the null hypothesis, indicating that two of them has no Graanger causality. In other words, the development of export is not the Granger reason for the change of industrial structure in Fujian and at the same time the change of industrial structure is neither the Granger reason for the change of export commodity structure.

4. The Relation between Import Commodity Structure and Industrial Structure

Similarly to the analysis of the relation between commodity structure and industrial structure, we now in this subsection analyze the relation between import commodity structure and industrial structure. We construct the following equation:

indstrchg=0.001088-0.023847*impstrchg (5)
(-2.47)

From this equation, we can do the co-integration test, whose results are summrzied in the Table 4.

Table 4 the co-integration test between import commodity structure and industrial structure

variable	ADF value	1% critical value	Test method (c,t,n)	Lag period	Conclusion
u2	-3.37	-1.97	n	0	Stable

From Table 4, we can tell that there is a corelation between import commodity structure and industrial structure. The parameter and coefficient value is -0.023, meaning that there is a negative relationship among dependent and independent variables. The existence of co-integration relationship shows that we in the next need to conduct the casuality test.

Table 5 the Granger causality test between import commodity structure and industrial structure

	F Statistic Value	Probability	Lag period
impstrchg is the Granger reason of indstrchg	5.31	0.04	1
indstrchg is the Granger reason of impstrchg	4.31	0.06	1
impstrchg is the Granger reason of indstrchg	7.40	0.02	2
indstrchg is the Granger reason of impstrchg	3.39	0.09	2
impstrchg is not the Granger reason of indstrchg	4.89	0.06	3
indstrchg is not the Granger reason of impstrchg	1.65	0.30	3
impstrchg is not the Granger reason of indstrchg	3.67	0.23	4
indstrchg is not the Granger reason of impstrchg	2.28	0.33	4

From Table 5, we can see that the Granger causality test of import commodity structure and industrial structure all reject the null hypothesis when the lag period is 1 and 2, indicating that two of them has no Graanger causality. However, within the lag period of 1 and 2, the industrial structure is rejected not to be the Granger reson. In other words, the development of import is the Granger reason for the change of industrial structure in Fujian and at the same time the change of industrial structure is also the Granger reason for the change of import commodity structure.

5. Summary

By applying the foreign trade data from 1999 to 2013 including export, import and industrial data including three industries, this paper analyzed the stability and relationship between export commodity and import commodity structure and industrial structure in Fujian province. Our empirical research firstly showed that there is long-term stable relationship between export, import commodity strucutre and industrial structure. Secondly, our research found that the industrial structure and import commodity structure are Granger reason to each other while the industrial structure and export structure does not have this corelation.

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