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Analysis of Japan's Economic Growth Under the Condition of Extroversion Economy

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Abstract: Japan moved towards the road of economic export-oriented development, foreign trade and foreign investment increased rapidly after World War II, and the economy recovered rapidly and came to the forefront of the world. Then, what role did foreign capital and foreign trade play in the process of economic growth? Based on the import, export FDI and GDP data of Japan from 1996 to 2015, this paper uses eviews 7.2 and co-integration test to confirm the long-term co-integration relationship between GDP and import, export, FDI. The results show that the long-term equilibrium relationship between GDP and export is positive correlation, and GDP and import, FDI are negatively related long-term equilibrium relations. The influence of Japan's export-oriented economy on economic growth is mainly through the form of export trade.

Keywords: Extroversion economy; Economic growth; Unit root test; Co-integration test.

1. Introduction

Export-oriented economic activity is an important manifestation of the integration of economies with global production activities, and it is an important factor affecting the economic development of the economy. With the deepening of economic globalization, the influence of economic extroversion on economic development is expanding. In the analysis of existing literature, scholars were more interested in econometric analysis in the analysis of the impact of economic extroversion.

From the point of view of modeling methodology, co-integration test and Grainger causality test were the most common modeling method. Gao (2009) did a empirical analysis through the use of co-integration test and Grainger causality test method with Shandong Province Import and export trade and GDP growth data, the results confirmed the existence of a number of notable one-way Granger causal relationship between Shandong export , import and economic growth , and there is a long-term stable equilibrium relationship and short-term dynamic equilibrium relationship between Shandong export , import and economic growth. Wang (2012) analyzed the causal relationship between economic growth and the export-oriented economy of Zhengzhou city by using co-integration test and Grainger test , based on the perspective of foreign trade, It was found that there is a two-way causal relationship between export trade and economic growth, and a individual causal relationship exists between FDI and economic growth. Using China's import , export andGDP data from 1982-2012, Huo (2015), performed empirical tests between them in the short term dynamic relationship through VAR model, co-integration test, impulse response, Granger test and other methods . Results showed that, in the long run, there is a positive equilibrium relationship between export trade and economic growth , but in the short term; the influence degree and contribution degree of export trade on economic growth are more significant, which is the main export-oriented engine influencing China's economic growth.

From the point of view of choice of variables, most literatures choose Import, export and foreign direct investment as the main factors that influence economic growth. Han Jiabin and Ma Zhangliang (2012) empirically analyzed the relationship between China's export and economic growth, and the results showed that there is a significant positive correlation between China's economic growth and exports. Chen (2016) established the model between export trade and economic growth, using the statistical data of major cities in Central China from 2000 to 2013, he empirically analyzed the impact of export trade on the regional economy. The results showed that export trade is one of the main driving forces for the overall economic development in the central region.

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2. Economic Development in Japan

2.1. The Process of Economic Extroversion in Japan

Japan is a country with a small territory and a shortage of natural resources. After the end of the Second World War, Japan, which was defeated and surrendered, was not only on the edge of the domestic economy, but also under the management of the American occupying forces, losing the autonomy of tariffs and almost completely severing its foreign economic relations. As a result of historical and geographical reasons, Japan's economic operation can only follow the road of a unification of economic development and economic extroversion. In order to achieve economic development, Japan resolutely chose the strategy of economic export-oriented development. The choice of the strategy is the key to the rapid development of modern Japan's economy, which has directly led to Japan's economic development walking in the forefront of the world.

Japan's economic export-oriented development strategy is based on heavy chemical industry, while the heavy chemical industry is based on the new industrial sectors with modern technology system. At the end of the Second World War, Japan was a backward capitalist country, and the heavy chemical industry must be developed. However, the infant industry, which had no international competitiveness, should be put under the active interference of the state. Therefore, Japan's economic export-oriented development strategy is composed of three different levels ,that is protection, support and opening up.

At the beginning of 1860s, the Japanese government began to implement the economic liberalization system, selectively carrying out trade liberalization and implementing capital freedom by stages. In June 1960, the Japanese government announced the outline of the liberalization of trade and foreign exchange.Thanks to the government's vigorous implementation, trade liberalization progressed rapidly, and free import goods increased from 40% in 1960 to 62% in 1961, and 83% in 1962 , and then up to 89% at the end of April in 1963 . In July 1967 the Japanese government implemented the first capital liberalization, then, after second time of liberalization of capital in 1969, third time of the liberalization of capital in 1970 and fourth time in 1971, the liberalization industry, with a foreign capital ratio of 100%, has accumulated to 443, and the cumulative liberalization industry with the foreign capital ratio of 50% or less has reached 1085. By the fifth capital liberalization in 1973, 100% of the capital liberalization was realized in principle.

2.2. Current Situation of Economic Development in Japan

The world economy has developed at a high speed since 1870s. As shown in Appendix 1, 1971 to 2015, the world GDP (as without special description, mentioned in the text of GDP are nominal GDP) grew rapidly, from 36,911 US dollars to 74,1769 us dollars. Over the past 45 years, world GDP has grown at an average annual rate of more than 7%, while its growth rate has remained positive, but its growth rate has decreased.

While the world economy is developing, the Japanese economy is developing at full speed. All along, Japan's economy plays an important role in the world economic system. As shown in the Appendix 1, 1971 to 1994, the ratio of Japan's GDP in world GDP gradually increased, the proportion reached 17.57% in 1994. With the continuous development of emerging economies, the Japanese economy in the world economic system gradually decline, but in 2015, the ratio of Japan's GDP in world GDP is still as high as 5.91%, its contribution to the world economy is self-evident.

As shown in Appendix 2, 1971 to 1980, Japan's GDP grew at a high rate of over 10%, compared with 8.39% in 1979 alone. From 1981 to 1991, Japan's economic growth rate was mostly no less than 5%, and then the growth rate hovered around 0%, The value of GDP reached a peak of 5,341,425 yen in 1997. Since 2011, the growth rate has been continuously raised, and GDP has increased from 4,914,085 yen to 5,304,657 yen. Thus, the explosive power and potential of Japan's economic growth can be seen.

With the growth of GDP, the proportion of imports, exports and foreign direct investment (FDI) in GDP has also been changing. From 1971 to 2015, the ratio of Japan's imports and exports in GDP basic synchronous changed, fluctuation in 10%, showing the trend of first decrease and then increase. the ratio of Japan's foreign direct investment (FDI) in GDP has increased year by year, from 0.62% in 1996 to 4.62% in 2015. Since 1996, the ratio of foreign direct investment in GDP has been significantly lower than that of foreign trade, and the impact of foreign trade on GDP might be much higher than that of foreign investment.

3. Empirical Test and Analyses of Results

3.1. Export-oriented Economic Indicators and Variable Selection

In the broad sense of the export-oriented economic development strategy, to measure the degree of export-oriented economic development, we can choose three "outside", namely, foreign trade, foreign investment and foreign economic cooperation. Keynes believes that consumption, investment and net exports are "three carriages" of driving the economy, so this paper chose two "outside", that is, foreign capital and foreign trade, as a measure of indicators. Considering the availability of data, as well as Japan's economic situation, the final selections are export, import and FDI as the main influencing factors of export-oriented economic growth.

3.2. Sample Description and Data Sources

The paper selects Japan's gross domestic product(GDP), export value(EX), import value(IM) and foreign direct investment(FDI) from 1996 to 2015 as the research sample data, using the Japanese consumer price index to

eliminate the effects of inflation. The data are taken from wind database. To eliminate heteroscedasticity, taking the natural logarithms of GDP, EX, IM, and FDI to study, and thinking of the LN GDP, LN EX, LN IM, and LN FDI as primitive sequences.

3.3. Stationarity Test and Analyses of Results

The data used in this paper are time series, so the stationarity test is necessary. The stationarity of time series means that the statistical laws of time series do not change with time. In order to guarantee the validity of the analysis, unbiasedness and consistency, and avoid the phenomenon of pseudo regression, the stationarity of the time series must be tested.

In this paper, the ADF method is used to perform the unit root test for the difference sequence of the original sequence and the original sequence. Before the unit root test, we determine whether it contains the sequence of constants and the trend through the line and symbol chart ,and then the regression model is selected according to the result of the line and symbol chart. The result of unit root test of the original sequence and the first difference sequence is shown in table 3-1.

The results show that the ADF values of the original sequences are larger than the critical values of 5%, and the adjoint probabilities are greater than 0.05, the hypothesis that there is a unit root cannot be rejected. So the original sequences of LN GDP, LN EX, LN IM, and LN FDI all have unit root and are non stationary sequences. The ADF values of the first order difference sequences of the original sequence are less than the critical value of 5%, and the adjoint probabilities are less than 0.05. So the first order difference sequences of original sequence do not have unit root, and show better stability. Therefore, all three variables are first-order single integer sequences, which consistents with the premise of co-integration between variables, and meet the conditions of further co-integration analysis.

Table-3-1. Results of Unit Root Test

Test variable	Augmented Dickey-Fuller test statistic	Test type （c，t，k）	5% critical value	Prob.*	Conclusion
LN GDP	-2.146442	（1,0,0）	-3.02997	0.2303	Non-stationary
LN EX	-1.726374	（1,0,0）	-3.02997	0.4029	Non-stationary
LN IM	-1.012634	（1,0,0）	-3.02997	0.7266	Noe-stationary
LN FDI	-0.94053	（1,0,8）	-3.175352	0.7338	Non-stationary
D(LN GDP)	-4.316968	（0,0,0）	-1.961409	0.0002	stationary
D(LN EX）	-5.007345	（0,0,0）	-1.961409	0.0000	stationary
D(LN IM）	-4.126447	（0,0,0）	-1.961409	0.0003	stationary
D(LN FDI)	-3.855935	（1,0,0）	-3.040391	0.0100	stationary

Note: the c, t and k in brackets in the table denote constant, trend, and lag orders, respectively. c or t equal to 1 means existence. When the ADF test value is greater than the 5% critical value, the sequence is not stationary.

3.4. Co-integration Test and Analyses of Results

In the analysis of co-integration of many variables, Johansen test is the most commonly used method. Johansen co-integration test determines the co-integration relationship by calculating the trace statistics and the maximum eigenvalue statistic. When the trace statistics and the maximum eigenvalue statistics are inconsistent, we usually choose the test results of trace statistics for analysis, because the trace statistics are more effective in general.

When the Johansen test is used to determine the co integration relationship of vectors, first of all, the deterministic trend hypothesis and the optimal lag period need to be chosen. The line and symbol chart shows that variables contain trend items, so choose the third item in the deterministic trend hypothesis "Intercept（no trend）in CE and test VAR". The best lag stage of the vector is defined as the 3 stage.

In this paper, the trace statistic and the maximum eigenvalue statistic are consistent. We choose the test result of trace statistics to analyze. If the trace statistic value is greater than the critical value, and the adjoint probability is less than 0.05, the original hypothesis can be rejected. While the trace statistic value is less than the critical value, and the adjoint probability is greater than 0.05, then the original hypothesis is not rejected.

As shown in table 3-2, we rejected the first three hypotheses and accepted the fourth hypothesis, which holds that there are at most three co-integration relations. This is the end of the test. Therefore, through the trace statistics, we can judge there are three co-integration relationship between LN GDP, LN EX, LN IM and LN FDI.

Table-3-2. Results of Co-integration test

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	5% Critical Value	Prob.**
none	0.986364	119.2949	47.85613	0.0000
At most 1	0.778576	46.27881	29.79707	0.0003
At most 2	0.630669	20.64834	15.49471	0.0076
At most 3	0.196313	3.71527	3.841466	0.0539

In addition, formula (3-1) is the co-integration formula with the largest log likelihood, and the relation is also the co-integration relation of regression in VEC. As can be seen from the formula, GDP and EX had a positive relationship with long-term equilibrium, while GDP was negatively related to IM and FDI. For every 1% increase in EX, GDP increased by 0.314%. While IM increased by 1% and GDP decreased by 0.141%. And an increase of 1% in FDI had less impact on GDP and had only reduced GDP by 0.037%.

LN GDP = 0.313878 * LN EX - 0.141328 * LN IM - 0.037463 * LN FDI　formula（3-1）

4. Discussion and Implications of Results

From results estimated above, based on the data of Japan from 1996 to 2015, this paper uses eviews 7.2 and co-integration test to confirm the long-term co-integration relationship between GDP and import, export, FDI. The results show that the long-term equilibrium relationship between GDP and export is positive correlation, and GDP and import , FDI are negatively related long-term equilibrium relations .Through the above analysis and demonstration, we get the following three conclusions:

First, open export-oriented strategy in Japan since 1860s achieved great success, not only the successful completion of the liberalization of foreign trade and foreign investment, and domestic economic growth achieved rapid development. Japan successfully achieved the post-war economic recovery and economic modernization goals.

Second, the influence of Japan's export-oriented economy on Japan's economic growth was mainly through the form of export trade. An increase in total exports would boost the growth of GDP, an increase of 1% in exports brought an increase of 0.314% in total GDP. The import trade undoubtedly inhibited economic growth, for every 1% increase in IM, GDP decreased by 0.141%.

Finally, Japan's foreign direct investment was not a major factor in economic growth, but slightly inhibited economic growth. When Japan's FDI increased by 1%, resulting in a 0.037% reduction in GDP, which might be due to the crowding out effect of FDI on domestic enterprises, and the policy advantage of FDI led to a greater crowding out effect on domestic direct investment.

5. Summary and Recommendations

Open export-oriented strategy in Japan achieved great success, and the influence of Japan's export-oriented economy on its economic growth was mainly through the form of export trade, Japan's foreign direct investment slightly inhibited economic growth. Based on the above research results, we puts forward the following suggestions:

First, continue to complete the process of economic export-oriented, strengthen the government's guiding role in export-oriented economy. Government departments should increase efforts to support enterprises, strengthen guide work of export-oriented economic development, and provide enterprises with an excellent environment for development.

Second, vigorously cultivate new export growth point. Relevant departments should actively support and promote enterprises to consolidate the traditional market and open up new markets. At the same time, regard strengthening the main body of foreign trade as an important means to change the mode of regional economic growth, implement a more proactive opening strategy, encourage enterprises to enter the emerging market, strive to foster new growth points, and support for steady growth of foreign trade exports.

Last, change the effect of foreign direct investment on economic growth, and pay attention to the introduction of FDI. Strictly formulate preferential policies for foreign investment to prevent the foreign capital from running on local capital. The effect of capital appreciation on foreign investment should be strictly checked, so as to prevent the low effect foreign capital from expelling the high effect domestic capital.

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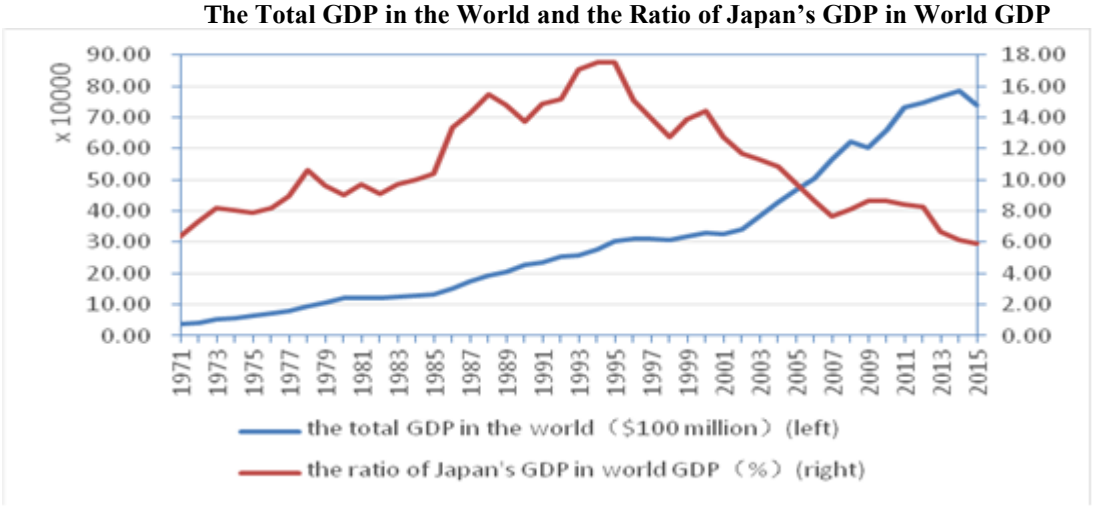
Appendix 1

The Total GDP in the World and the Ratio of Japan's GDP in World GDP



Appendix 2

Japan's GDP and GDP Growth Rate from 1971 to 2015