The Influence of Exports on Economic Growth—Evidence from Developed Countries

Qiang Jiang

School of Economics, Shanghai University, Shanghai 200444, China

Abstract

Under the period of Intra-Industry Trade, the real earning of exports will depend on the export in value added. Using the data of gross exports and exports in value added of developed countries to take empirical study on economic growth, the contrastive result shows that the influence of total exports on GDP is lower than the influence of exports in value added on TFP, the past research method can’t dig the deep reason how developed countries benefit from export. So, enhancing the export in value added is the important path that states will benefit from export, and turning the exports in value added to prompt the TFP is the core mechanism.

Keywords: Exports, Economic Growth, Developed Countries.

1. INTRODUCTION

Economic growth has always been a hot topic in academic research. Since classical economic growth theory to new economic growth theory, and then to endogenous economic growth theory, economic research has been based on the inherent and external driving force of economic growth (Solow, 1956; Arrow, 1962; Romer, 1987; Lucas, 1988; Grossman and Helpman, 1991). Export trade gradually integrates countries and regions into the global economic sharing category, which achieves the globalization of production and diversification of commodity consumption, so the role of export to promote economic growth is extraordinary (Mundell, 1957). Trade between Europe and the United States and trade in Western Europe led to large-scale trade expansion first in both North Atlantic. By the end of World War I, the level of economic development on both sides of the Atlantic has been far ahead of the world average. The rise of Japan after the war and the follow-up of the "East Asian four small" economies led economists to highly respect the "ELG" theory, and the rise of China further confirms the importance of export-oriented economic development strategies. Therefor export trade is often seen as a very important contributor to economic growth.

No matter inter-industry trade or intra-industry trade, export trade and GDP growth in developed economies almost simultaneously, but the present developed economies export trade arises a special phenomenon that compared to the export share of GDP rising developing countries, total exports accounted for the proportion of GDP is not high, but its economic growth has continued in good the expected development. Is the export of developed economies less effective in economic growth than in developing economies? In the stage of intra-product trade, how does export trade affect the economic growth of developed economies? In the past, scholars' research on "ELG" mostly supported the positive effect of the export of developed countries on economic growth, but today's reality seems to give us the impression that the positive effect of export trade on economic growth in developed economies is getting lower and lower.

According to the theory of new economic growth, technological progress is the endogenous driving force of economic growth, while per capita GDP can only be the performance of economic growth, so the study of the impact of the export of developed economies on economic growth needs to shift to the impact of the export of developed economies on technological progress. Global trade enters the intra-industry trade phase led by transnational corporations in developed economies, and the total level of export trade has been unable to represent the real benefits of exports. In the empirical study, the impact of technological growth on the export value data of developed economies will be more accurate than the previous study on the total export data and GDP.

2. THE VALUE OF ACCOUNTING METHODS
By using the input-output coefficient in the input-output table, the trade reentry issue of the export commodities is calculated, so that the value of the export trade of a country is calculated more accurately, but the interpretation of the accounting method is not systematic. Until Stehrer (2012) systematically explained the value-added accounting for export trade, the document was seen as the most detailed literature on the system's export value-added accounting. The idea is based on the export-oriented country's perspective, which is derived from the value-added of the goods of the exporting country and takes into account the issue of trade reintegration. However, the trade reentry phenomenon is only the first time to return, without considering the import and export of intermediate goods, but the problem with the world non-competitive input-output table covered by the limited data. Taking into account the current accounting techniques and matrix computing methods, this article prefers to use the Stehrer (2012) accounting method, and further imitate the method of Stehrer (2012) introduced the export value of the export level accounting. The following is a detailed description of the method. The current data on the value-added of export trade at the national level is mainly the world non-competitive input-output table published by each country and the WIOD database. The following table abstracts the input-output table in the WIOD database as follows.

<table>
<thead>
<tr>
<th>Output</th>
<th>intermediate goods</th>
<th>final goods</th>
<th>Gross output</th>
</tr>
</thead>
<tbody>
<tr>
<td>input</td>
<td>Country1 X_{ij}</td>
<td>F_{1j}</td>
<td>F_{ir}</td>
</tr>
<tr>
<td></td>
<td>Country2 X_{ij}</td>
<td>F_{2j}</td>
<td>F_{ir}</td>
</tr>
<tr>
<td></td>
<td>……</td>
<td>……</td>
<td>……</td>
</tr>
<tr>
<td></td>
<td>Country r X_{ij}</td>
<td>F_{1r}</td>
<td>F_{jr}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>……</td>
<td>……</td>
</tr>
<tr>
<td>Added value</td>
<td>V_i</td>
<td>……</td>
<td>V_r</td>
</tr>
<tr>
<td>Gross input</td>
<td>X_i</td>
<td>……</td>
<td>X_r</td>
</tr>
</tbody>
</table>

This table is the basic model of the world's non-competitive input-output, and internally simplifies the industry's input-output module, where $X_i$ is the amount of intermediate goods that country $i$ exports to country $j$;

$F_i$ indicates the final commodity value of the $i$ country's exports to country $j$;

$V_i$ indicates the increase in the value of the commodity of country $i$;

$X_i$ represents the total output of country $i$.

To calculate the value of export trade, it is necessary to calculate the value added of the goods of the exporting countries included in the imported goods of the destination country. The World Non-Competitive Input-Output Table shows the source and destination of intermediate commodities and final merchandise, and the statistical value-added of export trade requires statistics on the added value of the country's exports and the added value of the country in the final commodity. At the same time, we should deduct the part of the intermediate goods and the final goods returned in the trade return phenomenon. Based on the structure of the World Non-Competitive Input-Output Table, the following identities are obtained:

$$X = AX + F = LF$$

Where $X$ is the total output vector of CG * 1, C is the number of countries, G is the number of industries, A is the input-output coefficient matrix for CG * CG, and F is the final consumption demand vector for CG * 1, $L = (I-A) \wedge (-1)$, $L$ is the inverse of the Lyon tiffon inverse in international trade. The specific vector and matrix representation are represented by the following forms:

$$A = \begin{pmatrix} A_{11} & A_{12} & \cdots & A_{1r} \\ A_{21} & A_{22} & \cdots & A_{2r} \\ \vdots & \vdots & \ddots & \vdots \\ A_{r1} & A_{r2} & \cdots & A_{rr} \end{pmatrix}, L = \begin{pmatrix} L_{11} & L_{12} & \cdots & L_{1r} \\ L_{21} & L_{22} & \cdots & L_{2r} \\ \vdots & \vdots & \ddots & \vdots \\ L_{r1} & L_{r2} & \cdots & L_{rr} \end{pmatrix}, F = \begin{pmatrix} F_{11} & F_{12} & \cdots & F_{1r} \\ F_{21} & F_{22} & \cdots & F_{2r} \\ \vdots & \vdots & \ddots & \vdots \\ F_{r1} & F_{r2} & \cdots & F_{rr} \end{pmatrix}$$

X represents the unit matrix,
Where \( A_j = X_j/X_i \), \( A_p \) means that the total output in country \( j \), the use of country \( i \) of the proportion of intermediate goods, the matrix of other elements and so on. In order to simplify the analysis, taking the three models as an example, each country has only one industry, and then gradually expands the model, extended to the \( N \) state. Assuming that there are three countries \( r, s, t \) expand the identity of the world's non-competitive input-output table:

\[
\begin{bmatrix}
X_r \\
X_s \\
X_t
\end{bmatrix} = \begin{bmatrix} A_{rr} & A_{rs} & A_{rt} \\
A_{sr} & A_{ss} & A_{st} \\
A_{tr} & A_{ts} & A_{tt}
\end{bmatrix} \begin{bmatrix} X_r \\
X_s \\
X_t
\end{bmatrix} + \begin{bmatrix} F_r \\
F_s \\
F_t
\end{bmatrix} = \begin{bmatrix} L_{rr} & L_{rs} & L_{rt} \\
L_{sr} & L_{ss} & L_{st} \\
L_{tr} & L_{ts} & L_{tt}
\end{bmatrix} \begin{bmatrix} X_r \\
X_s \\
X_t
\end{bmatrix} + \begin{bmatrix} F_{rr} + F_{rs} + F_{rt} \\
F_{sr} + F_{ss} + F_{st} \\
F_{tr} + F_{ts} + F_{tt}
\end{bmatrix}
\]

Each element in the \( L \) matrix represents the sub-matrix of the \( G \times G \) dimension, respectively, representing each element of the Lyndon's inverse matrixes. \( F_r = F_{rr} + F_{rs} + F_{rt} \), \( F_s = F_{sr} + F_{ss} + F_{st} \), \( F_t = F_{tr} + F_{ts} + F_{tt} \), each of them represents the final consumer goods of each country, and the right side of the equal sign represents the whereabouts of the final consumer goods. At the same time, for the following logical expression, the final consumer column vector for each country is further given, including the final consumer goods consumed by the consumer and the final consumer goods imported from other countries. \( r_s = (F_{rs}, F_{ss}, F_{ts})^T \), \( s_t = (F_{tr}, F_{ts}, F_{tt})^T \), \( t_s = (F_{sr}, F_{st}, F_{tt})^T \). We will account for bilateral export trade value-added, total export trade value-added and industrial-level export trade value-added in this framework. The following will be expanded.

### 2.1 Bilateral export trade value-added accounting

Based on the above model, the added value, which is from country \( r \) exporting to the country \( s \), needs to account for the final consumption of the country from the \( r \) part of the increase in value. The added value of the \( r \) country included in the final consumption of the country \( s \) is mainly composed of three parts:

First, the final consumer goods imported by \( s \) countries from \( r \) countries, including the value of country \( r \);

Second, the value created by intermediate commodities imported from \( r \) countries in the final commodities of country \( h \);

Finally, \( t \) exports to country \( s \) in the final consumer goods, the use of \( r \) countries in the middle commodity, the value of this part of the creation of intermediate commodities.

The detailed formula is as follows:

\[
EX_{rs} = (v^r, 0, 0) \begin{bmatrix} L_{rr} & L_{rs} & L_{rt} \\
L_{sr} & L_{ss} & L_{st} \\
L_{tr} & L_{ts} & L_{tt}
\end{bmatrix} \begin{bmatrix} F_{rs} \\
F_{ss} \\
F_{ts}
\end{bmatrix}
\]

Expanding the above formula can be obtained \( EX_{rs} = v^r L_{rs} F_{rs} + v^s L_{ss} F_{ss} \), where \( v^r = V_r/X_r \). It represents the value added rate of domestic value in the production process of country \( r \). \( v^r L_{rs} F_{rs} \) represents the added value of country \( r \) included in the final consumer goods. \( v^s L_{ss} F_{ss} \) represents country \( s \) consumption of the country's final merchandise, the country's final merchandise used country \( r \) goods to create the value; \( v^s L_{ss} F_{ss} \) expressed the value of the intermediate goods of the country \( t \), and the goods of the country \( s \). And so on, you can get \( t \) export to \( t \) and \( s \) exports to \( t \)'s export trade value-added.

Again to country \( r \) to export the \( m \) country's export value-added, for example, the specific formula is as follows:

\[
EX_{rt} = (v^r, 0, 0) \begin{bmatrix} L_{rr} & L_{rs} & L_{rt} \\
L_{sr} & L_{ss} & L_{st} \\
L_{tr} & L_{ts} & L_{tt}
\end{bmatrix} \begin{bmatrix} F_{rt} \\
F_{st} \\
F_{tt}
\end{bmatrix}
\]

The Lyndon inverse matrix does not change. For country-specific value-added calculations, you need to adjust the value-added rate to a specific country and place it in the appropriate location, and the third part of the final consumer goods vector needs to be based on the export destination countries of the final consumer goods vector, the type of development can get the corresponding three parts.
2.2 Value-added of total export trade

Accounting country r exports to country s and country t trade value added. According to the matrix of the merger operation, the country r exports to the country s and country r export to country t trade value added, the following formula:

$$EX_{rt} = (v', 0, 0) \begin{bmatrix}
L_{rr} & L_{rs} & L_{rt} \\
L_{sr} & L_{ss} & L_{st} \\
L_{tr} & L_{ts} & L_{tt}
\end{bmatrix} \begin{bmatrix}
F_{rs} + F_{rt} \\
F_{ss} + F_{st} \\
F_{ts} + F_{tt}
\end{bmatrix}$$

The formula can be extended to a country's exports to multinational trade value-added accounting, in the final consumer goods vector, the export destination country's consumption vector summed on the original basis; you can get a country's export value of multinational trade accounting results.

2.3 Appraisal of value-added accounting for export trade of industry

Based on the idea of total added value of export trade, we continue to adopt the model of calculating total amount of added value of export trade, assuming that there are three countries R, s and T, and there are two industries, a and B. According to the world non-competitive input-output table, the non-competitive input-output tables of three countries and two industries are constructed. See Table 2 for details:

<table>
<thead>
<tr>
<th>Output</th>
<th>Intermediate Goods</th>
<th>Final Goods</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>r_a r_b s_a s_b t_a t_b</td>
<td>r s t</td>
<td>X_{ra} X_{rb} X_{sa} X_{sb} F_{ra} F_{rb} F_{sa} F_{sb}</td>
</tr>
<tr>
<td>Added Value</td>
<td>V_{sa} V_{sb} V_{ra} V_{rb}</td>
<td>t_a t_b</td>
<td></td>
</tr>
<tr>
<td>Gross Output</td>
<td>X_{ra} X_{rb} X_{sa} X_{sb}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table is the basic model of the world non-competitive input-output table for dual industry in the three countries, composed of r, s and t countries, including industrial classification by a and b two industrial composition, where X_{ijy} represents that country i's industry x exports to the country j, which is used as intermediate goods of industry y. F_{ijy} stands that country i's industry x exports to country j, is taken as the final consumption of goods. V_{ijy} indicates the added value of country i's industry x, and X_{ij} represents the total output of country i's industry x, and the total value of intermediate commodities and added value is the total output.

According to the basic relation of the world non-competitive input-output table, the basic relation between input and output still exists:

$$X = AX + F = LF$$

X is the total output vector of 6*1; F is the final goods output vector of 6*1; each element of the final goods output vector consists of three parts and the total final goods economy each industry production to supply three countries, so for the three part of the total F_{ij} = F_{ir} + F_{ir} + F_{ir}, L=(I-A)^{-1} still represents the Leontief inverse matrix. First, the total value of the total export trade of a single sector of the economy is calculated, taking country r's industry a, exports to the country s and country t export trade value as an example is still based on the export perspective, the specific calculation formula represented by the formula:
where \( v_{it} = V_{it} / X_{it} \) said the country r’s industry a’s added value rate, expanding above formula can be obtained:

\[
EX_{it} = v_{it} L_{it} \left( F_{ta} + F_{ta} \right) + v_{it} L_{it} \left( F_{tb} + F_{ta} \right) + v_{it} L_{it} \left( F_{sb} + F_{ta} \right) + v_{it} L_{it} \left( F_{sb} + F_{ta} \right) + v_{it} L_{it} \left( F_{ta} + F_{tb} \right) + v_{it} L_{it} \left( F_{tb} + F_{tb} \right) + \epsilon_{it}
\]

The first item is the value added in the final commodities of country r’s industry a, which is imported by both country s and country t; Second items is the final commodity of country r’s industry b, which is imported by country s and country t, and industry b used the value-added part of industry a’s intermediate commodities. The third item is the value-added part created by intermediate commodities of country r’s industry a, which is from the final commodities of country s’s industry a used by country s and country t; The fourth item is the value-added part created by intermediate commodities of country r’s industry a, which is from the final commodities of country s’s industry b used by country s and country t; The fifth item is the value-added part created by intermediate commodities of country r’s industry a, which is from the final commodities of country t’s industry a used by country s and country t; The sixth item is the value-added part created by intermediate commodities of country r’s industry a, which is from the final commodities of country t’s industry b used by country s and country t; As for the bilateral export trade industry added value accounting, logical thinking and national level export trade value accounting are the same. Aiming at country export trade value, in the final goods vector, each country can only keep the purpose of final goods.

3. MODEL CONSTRUCTION AND DATA DESCRIPTION

3.1 Model construction

First of all, the impact of the export value of advanced economies on technological progress is studied, and the following econometric models are set up:

\[
TFP_{it} = C + \alpha Tiva_{it} + \beta Contral_{it} + \mu_{it} + \epsilon_{it}
\]

\( TFP_{it} \) represents the total factor productivity level of all countries over the years, and \( Tiva_{it} \) represents the added value of the per capita export trade of all countries over the years, and \( Contral_{it} \) is the controlling variable. Further introducing R&D investment, education investment, import trade and marketization degree as control variables, and the added value of per capita export trade value of the absolute value is logarithmic, and the model is further set as follows:

\[
TFP_{it} = C + \alpha LnTiva_{it} + \beta_{1} R&D_{it} + \beta_{2} Education_{it} + \beta_{3} Importt_{it} + \beta_{4} Markett_{it} + \mu_{it} + \epsilon_{it}
\]

\( R&D, \) \( Education, \) \( Import, \) \( Market \) respectively indicates R&D investment as a share of GDP, education expenditure as a share of GDP, import trade as a share of GDP, and marketization index

In addition to the above model, the impact of the total amount of exports of developed economies on GDP is needed to study, and make a comparative study, and further give the following model:

\[
GDP_{it} = C + \alpha Ex_{it} + \beta Contral_{it} + \mu_{it} + \epsilon_{it}
\]

\( GDP_{it} \) stands for economic growth, which is represented by GDP per capita. \( Ex_{it} \) represents the per capita export volume of countries over the years, and \( Contral_{it} \) stands for control variables. Romer (1987), Lucas (1988) as the
representative of the new economic growth theory suggests that the level of technological progress, human capital and material capital improvement and enhance the efficiency of resource allocation are conducive to the economic growth. Among the control variables that affect economic growth, further research and development inputs, physical capital stocks, human capital levels, FDI, and the market efficiency of resource allocation efficiency are taken as control variables. The model is further configured to:

\[ \text{GDP}_t = C + \alpha E_{x,t} + \beta_1 \text{R&D}_{t} + \beta_2 \text{PCapital}_{t} + \beta_3 \text{HCapital}_{t} + \beta_4 \text{FDI}_{t} + \beta_5 \text{Market}_{t} + \mu_t + \epsilon_{it} \]

R&D<sub>t</sub> stands for R&D investment accounted for GDP; PCapital<sub>t</sub> represents the per capita physical capital stock; HCapital<sub>t</sub> represents the level of human capital per capita; FDI<sub>t</sub> represents the net inflow of foreign direct investment over the years accounted for GDP; Market<sub>t</sub> means marketization.

Since the absolute number of the partial variables is large, the model following the logarithm is as follows:

\[ \ln \text{GDP}_t = C + \alpha \ln E_{x,t} + \beta_1 \text{R&D}_{t} + \beta_2 \ln \text{PCapital}_{t} + \beta_3 \text{HCapital}_{t} + \beta_4 \text{FDI}_{t} + \beta_5 \text{Market}_{t} + \mu_t + \epsilon_{it} \]

### 3.2 Data description and source

1. Data description

The non-competitive input-output table which is published by WIOD database mainly includes the input-output data of 43 countries and regions in 1995-2011 and 40 regions and countries in 2000-2014. The organization for economic cooperation and development is an international organization which is composed by more developed market economy countries. The member states’ economic development and the level of social development are in the higher degree, and OECD economy is generally higher than other non OECD countries. Considering the data availability and neat, the study chooses 16 members of the OECD from WIOD database as part of the study sample countries (The sample countries include Australia, Austria, Belgium, Canada, Germany, Denmark, Spain, Finland, France, the United Kingdom, Ireland), covering a period of 1995-2014. The data needed for the measurement model comes from the World Bank database, the United Nations database, and the WIOD database. The added value of the total export trade and the bilateral export value added accounting has been given above. The accounting process of the physical capital stock and the market index will be given below.

2. Physical capital stock accounting

The physical capital stock calculation is based on the perpetual inventory method of Goldsmith (1951), and the concrete formula is as follows:

\[ K_t = \frac{K_{t-1}}{1 - \delta} + I_t \]

\( K_t \) shows the material capital stock of the period t; \( K_{t-1} \) represents the material capital stock of countries in the t-1 period; \( \delta \) stands for the depreciation rate of physical capital; \( I_t \) indicates the material capital input flow of the period t; In order to be unified to the base material capital stock price level, with all over the price indices of investment in fixed assets will be converted to the base flow of the material capital investment level in 1995; \( \delta \) is capital depreciation; As for the stock of physical capital in each country in 1995, based on the logic of Coe & Helpman (1995), the concrete formula is as follows:

\[ K_t = \frac{I_t}{g + \delta} \]

\( g \) is the geometric growth rate of investment in fixed assets in recent 1995-1998 years in the past three years; \( \delta \) is the capital depreciation rate which is 9.6% calculated by Zhang Jun (2004).

3. Marketization index

As for the data of the market index of various countries over the years, there is no unified method to calculate the market index in the world.
Fan Gang, etc. (2003), has announced marketization index of Chinese several years, and the accounting methods mainly adopts weighted sum of the multidimensional index. Based on Fan Gang, etc. (2003) 's accounting methods, taking into account the availability of data and indicators that can reflect the degree of marketization of different countries, multidimensional variables are selected to calculate the market indexes of each country. There are many factors that influence the market level, but they are mainly in the three core categories: the government behavior and the market relations, the free allocation of production factors and the perfection of the market system. Therefore, this article is based on the above three core categories, and then calculates the market index of all economies over the years.

Availability of data, the proportion of R&D personnel who work in the private sector accounts for the level of free allocation of production factors; government spending amounts to GDP, reflecting the relationship between government actions and the market;

And the amount of patent applications per 1000 people reflects whether the market system is perfect or not.

The actual value of 3 indexes is converted to the relative index of 1 point system. Taking the proportion of the total R&D personnel in the private sector as an example, according to the mobility of production factors, mobility of production factors in the Private sector production factors are more liquid than non-private sectors, in accordance with the basic price of production factors allocation, so the greater the proportion of factors of production in the private sector, the higher the degree of marketization. Set the base period to 1995, specific to the private sector work of the R&D staff ratio, the economy of private sector the lowest proportion of R&D personnel in 1995 is set to 0 points, and the economy of the highest proportion is set to 1 point; On this basis, compared to other economies accounted for 0 to 1 points in the distance to determine the corresponding score, the specific formula is as follows:

$$\frac{S_i - S_{\text{min}}}{S_{\text{max}} - S_{\text{min}}}$$

$S_{\text{max}}$ is the maximum value of the index base; $S_{\text{min}}$ is the minimum value of the base period of the indicator; $S_i$ is the individual index value for specific needs. Individual accounting results are distributed in the base period of 1995 between 0 to 1, but the following year with the developments, accounting value will be likely more than 1 or less than 0. However, some indicators in the market level are not reflected in the bigger, the better. If government expenditure accounts for GDP of the current year, according to the relationship between the government and the market, the greater its ability to intervene in the market, and will correspondingly occupy the scale of expenditure of individual consumers in the market. As a result, the less government spending, the lower it can intervene in the market, and the higher degree of marketization. In this case, the above formula will appear as a result of the logical reversal, so the formula for such a case is further expressed as follows:

$$\frac{S_{\text{max}} - S_i}{S_{\text{max}} - S_{\text{min}}}$$

The specific indicators described are the same as above. When the synthetic three-dimensional index constitutes the overall marketization index, the practice of the American Heritage Foundation is adopted that give the weights of the three indexes to calculate the whole market index.

4. EMPIRICAL ANALYSIS

The endogenous problem between export trade and economic growth has been proved by lots of scholars, therefore need to select the tool variables to solve the endogenous problem. According to the experience of the past, with the prerequisite of geographical features, especially land area and economy spatial distance, the two relatively independent economic growths, so the geographical features are often used as a tool for export trade variables (Frankel and Romer, 1999; Irwin and Tervio, 2002; Easterly and Levine, 2003). The bellowing will be modeled on the above research of instrumental variables.

Based on the thinking of the patterns about international trade, the trading partner is mainly embodied in north-South trade and South-South cooperation way, but developed economies is still the main export market, especially in the three major export markets in Japan, The United States and Western Europe, according to the
World Trade Center development Commission database accounting, the three markets dominate 70% of the world the export market. So will all coastal ports to the bottom of the three regions in coastal port coastline and distance as the export of instrumental variables, and using the three areas of Japan, The United States and Western Europe imported and added value of imports accounted for as the weights will capitals to the three area coastline distance and ex treatment. Taking the proportion of added value import as an example, the specific accounting formula is as follows:

\[
1/IV_{\text{distance}} = \frac{Tiva_{\text{IM, Japan}}}{\sum_{i=1}^{3} Tiva_{\text{IM}}} \times \text{distance}_{\text{Japan}} + \frac{Tiva_{\text{IM, European}}}{\sum_{i=1}^{3} Tiva_{\text{IM}}} \times \text{distance}_{\text{European}} + \frac{Tiva_{\text{IM, US}}}{\sum_{i=1}^{3} Tiva_{\text{IM}}} \times \text{distance}_{\text{US}}
\]

Among them, \(\sum_{i=1}^{3} Tiva_{\text{IM}}\) means the sum of the added value of import trade among Japan, The United States and Europe, \(Tiva_{\text{IM, Japan}}\) means Japan import added value, \(\text{distance}_{\text{Japan}}\) means most close distance the economies’ coastal ports to Japanese’s coastal ports, other variable and so on, \(IV_{\text{distance}}\) means the variables of the export value-added tool, according to the map of Baidu, the value of import trade of three regions of Japan, the United States and Western Europe increased. The exogenous variables, namely the geographical characteristics of the impact on economic growth only through the export trade, the study of this problem based on the qualitative analysis, the validity of the previous tool variables have been discussed.

According to the measurement results, the per capita export value had a significant effect on TFP, which indicates that technological progress in representing long-term economic growth of developed economies will benefit from the growth of export trade added value. The short-term economic growth of developed economies will benefit from the expansion of total export trade. Mixed regression, random effects and fixed effects econometric analysis results are very significant to support this conclusion. After considering the endogenous problem, the result of 2SLS regression is still very significant. Considering the results of GMM regression, variance still does not change significantly. By comparing the results of Table 4 and table 5, the impact of per capita export trade value on TFP is far greater than the impact of per capita export on GDP per capita. Combined with the actual situation of developed economies, the impact of export trade on economic growth will be in line with the characteristics of intra product trade. However, in the past, the study of per capita GDP based on total exports did not explain the fact that developed economies were exporting at a steady pace and the economy continued to rise.

Some variables do not meet expectations before taking into account endogenous problems in control variables. Considering the endogenous problem, the coefficients of the non-core explanatory variables are more consistent with the expected results in the regression results of the two-stage least squares method. R & D investment has a significant effect on total factor productivity. Developed economies as a technology leader, the source of its technological progress mainly rely on their own independent innovation; Education input has a significant promoting effect on total factor productivity. In econometric analysis, the impact factor of current education input on total factor productivity is not significant. Generally speaking, education plays a lagging role in promoting technological progress and economic growth; the import trade has hindered the total factor productivity, and imports of developed economies are mainly energy and mineral resources, and primary intermediates that satisfy the production of value chains, whose technical level of connotation is low, so the import trade of developed economies cannot effectively realize the technology spillover and diffusion; The market level plays an important role in promoting total factor productivity, and the market allocation is still the most efficient method in the allocation of resources.

In the control variables that affect per capita GDP, R&D investment is still an important control variable that affects its growth, and innovation has a very important role both in terms of short-term and long-term economic growth or long-term sustainable growth; the positive effect of material capital stock on per capita GDP is very significant, which is consistent with the conclusion of classical economic growth theory-- The Importance of Capital Stocks to Economic Growth; but the increase in the level of human capital on GDP per capita did not show a significant positive effect.

Taking the number of years of education as a measure of human capital level, after the increase in the number of years of education, the labor force may spend more time on leisure; FDI inflows have no positive effect on per capita GDP, and the squeeze effect and competitive effect of foreign capital are not conducive to economic growth in well-capitalized developed economies; However, the upgrading of the market is still conducive to the improvement of per capita GDP, and the market allocation of resources will increase output while conserving resources.
5. CONCLUSION

Based on the reality that low growth speed of exports, but high standard economic growth in developed countries which led to the research topic that how to explain this phenomenon. Rely on the research method early days on “ELG” hypothesis, low scale exports is so difficult to prompt economic growth in developed countries. Because of losing the real export earning, so the empirical study will to be failure. Under the period of intra-industry trade, the export in value added is the real earning. This paper compared the traditional research results with new-view research results and found that the influence of exports in value added on TFP is more than the influence of gross exports on GDP. So enhancing the export in value added is the important path that states will benefit from export, and turning the exports in value added to prompt the TFP is the core mechanism.

REFERENCES