An Empirical Study on the Relationship between Economic Openness and Economic Growth in China

Mengshan Zhu
China Agriculture University
Beijing, China

Abstract: Economic openness is the measure of economic activity in the country comprehensive index. How is economic openness indicator measured? Chinese economy has experienced rapid growth for more many years, what is on earth the effect of economic opening on Chinese economic growth? The answer to this question will provide instructive revelation about the selection of Chinese reasonable opening policy. Economic openness is measured by trade openness, foreign investment openness and financial openness in this paper. Based on Solow economic growth model and beginning with foreign trade, foreign investment and financial development, this paper made regression analysis using Chinese data from 1985 to 2004. The empirical analysis indicates that the domestic capital input is still the primary element that promotes Chinese economic growth, by contrast, the effect of foreign trade and foreign investment on Chinese economic growth is faint. Again, financial development on the impetus of economic growth in China has a room to rise.

Keywords: Economic opening; Financial development; Chinese economic growth; Empirical analysis

1. INTRODUCTION

Since the Chinese Economic Reform and open up, China's economic development has made remarkable achievements. Foreign trade and foreign investment have increased significantly. The level of financial development has also been continuously improved. The degree of integration of finance and trade in the real economy has also deepened, and future economic growth will depend on more effective expand and deepen opening to the outside world. However, opening up to the outside world is a double-edged sword. On the one hand, it will bring economic benefits to a country and it will also need to pay a corresponding price. The process of economic opening in each country is the coexistence of benefits and costs, besides opportunities and challenges. Therefore, the problem we face is not whether to open to the outside world, but how to effectively and rationally implement opening up to the outside world. Specifically, we should evaluate whether a country's openness is based on whether it is conducive to promoting domestic economic growth. However, all along, new methods and viewpoints have emerged in the field of measurement and measurement of openness, and the practice and understanding of openness have continued to enter a new stage. The requirements of foreign economic opening have involved exchange rate policy, monetary policy, the finance system and macroeconomic. Therefore, this paper constructs a new openness index system from three aspects of trade openness, foreign capital openness and financial openness, and adopts data from 1985 to 2004 on economic growth and the empirical analysis was conducted on the relationship between openness to the outside world.

2. A REVIEW OF THE RESEARCH ON THE RELATIONSHIP BETWEEN OPENING UP AND ECONOMIC GROWTH

The research on the relationship between the degree of opening up to the outside world and economic growth has a long history. In general, most of the viewpoints believe that opening to the outside world can promote economic growth. However, there are significant differences in the views of different schools on the specific process of opening up to economic growth and the internal mechanism.

2.1 Theoretical Research Review

Earlier economists looked at the relationship between openness and economic growth mainly from the perspective of foreign trade. In the 1930s, British scholar Robertson (D.H. Robertson) proposed for the first time that foreign trade is the engine for economic growth (engine for growth) proposition. The main focus is that the backward countries can promote their own economic growth through foreign trade, especially export growth. Harrison analyzed the relationship between trade openness and economic growth using seven indicators of trade openness. [1] In 2003, domestic scholars Bao Qun et al. selected the five indicators of trade dependence, actual tariff rate, black market transaction fees, Daulas index and revised trade dependence to measure the degree of trade openness to economic growth since China's reform and opening up. [2] Foreign direct investment (FDI) mainly affects its economic growth by promoting the capital accumulation and technological progress of the host country. The conclusion that FDI contributes to the accumulation of capital in the host country stems from the double-gap theory proposed by Chen (1966). DeMello (1999) studied the relationship between FDI and economic growth in OECD countries. The conclusion is that only when FDI and domestic investment are complementary, FDI has a positive impact on economic growth. He Zhengxia started from the perspectives of foreign investment and foreign trade, and examined the actual effect of economic opening on China's economic growth. [3]

2.2 Empirical Research Overview

Early empirical research on the relationship between external development and economic growth mainly focused on the test of export-led economic growth (ELG). In the past 20 years, scholars have conducted extensive research using different models and analysis methods for different countries and regions. The relevant studies can be divided into the following two categories.

(1) This type of research uses cross-country (regional) cross-sectional data and uses rank correlation tests and OLS regression methods to directly analyze the relationship between external and GDP, or join labor, capital, and investment with such elements as export factors, the OLS regression method is used to analyze the impact of exports on economic growth. The number of selected countries (regions) is not equal, and different periods are used. For example, Luo Zhongzhou used panel data from 1994 to 2005 to conduct a comparative study of the relationship between openness and economic growth in the Pearl River Delta, the Yangtze River Delta, and the Bohai Rim. [4]

(2) In recent years, time series analysis based on individual country data has become mainstream, and the most widely used analysis method is the Granger causality test. Some of the variable systems considered in this type of research only examined the bivariate systems of openness and GDP, and some added variables such as investment, technological progress, and exchange rate in the bivariate system. Because of the differences in model methods and the selection of variables, the conclusions of such empirical research are inconsistent. For example, Lan Yisheng empirically analyzed the relationship between the degree of openness and economic growth in various regions of China from 1985 to 1998 and believed that opening to the outside world has strongly promoted the growth of China's national economy. [5]

3. CONSTRUCTION AND ANALYSIS OF OPENNESS INDEX SYSTEM

The degree of economic openness is an important indicator for measuring the level of open economy. At present, the research on the relationship between openness and economic growth has received increasing attention from the academic community, but no consensus has been reached on the selection of indicators for economic openness. Earlier economists, when measuring openness to the outside world, often only examined the dependence on foreign trade, that is, the ratio of total import and export trade to gross domestic product (GDP). Although this method is intuitive and simple, in the course of the study, people gradually measure the degree of openness with the degree of trade dependence, because a country's trade dependence is affected by factors such as the country's capital level, financial conditions, and government policies. Therefore, the degree of trade dependence does not fully reflect the level of openness. Since then, more scholars have measured the degree of openness from the perspective of international openness in foreign trade, foreign direct investment, etc., and studied the internal relationship with economic growth, thus making great progress. However, with the acceleration of the free flow of financial capital in the world, virtual capital plays an increasingly important role in the foreign economy. Therefore, based on previous research, this paper integrates financial openness into the economic openness index system. The formula is as follows:

China's economic openness = (trade openness + foreign capital openness + financial openness) /3

which is

$$EO = (TO + IO + FO)/3 \qquad (1)$$

Among them, EO is China's economic openness, TO is China's trade openness, IO is China's foreign capital openness, and FO is China's financial openness.

$$TO = TO_{Goods} + IO_{services} =$$
$$\frac{Commodity\ trade\ import\ and\ export + \text{Total import and export of service trade}}{GDP}$$
$$(2)$$

$$IO = IO_{accept} + IO_{outside} =$$
$$\frac{China\ actually\ accepts\ total\ foreign\ direct\ investment + \text{Total foreign direct investment}}{GDP}$$
$$(3)$$

$$FO = (FO_{currency} + FO_{capital})/2$$
$$FO_{capital} = FO_{Securities} + FO_{other}$$

which is

$$FO = \frac{(FO_{currency} + FO_{Securities} + FO_{other})}{2}$$
$$= $$
$$\left(\frac{Central\ Bank's\ foreign\ net\ assets}{Central\ Bank's\ total\ assets} + \right.$$
$$Total\ securities\ investment + Total\ other$$
$$investment GDP/2 \qquad (4)$$

The above indicators comprehensively reflect the level of a country's economic internationalization from the perspective of breadth [6]. The TO indicator is actually an opening degree of a state-owned commodity market and an intangible commodity market. The openness of the intangible commodity market is often overlooked by people. However, the importance of this market to the national economy has been greatly improved and can't be ignored. IO reflects the openness of China's foreign capital market. It should be noted that in order to highlight the importance of FDI, the IO in this article refers to the opening of direct investment, and does not include other investment in securities investment. Our country accepts the openness of foreign investment and our country directly The openness of investment constitutes. In addition, securities investments and other investments are an important part of the economic activities in the capital market and cannot be ignored. This article is included in the open financial sector. The FO reflects the opening level of China's financial market, which consists of two indicators: the openness of the currency market and the openness of the capital market. Among them, the degree of capital openness is again composed of two sub-indicators: the degree of openness of securities investment and the degree of other investment. The FO currency represents the opening level of a country's currency market. Here, the ratio of foreign assets of the central bank to its total assets is used as a measure to measure the importance of foreign currency in the domestic currency supply.

According to the statistical yearbook data of the relevant year, China's trade openness, foreign capital openness, financial openness, and openness were calculated from 1985 to 2004. It can be seen that since the reform and opening up, the overall level of China's openness has been continuously rising.

Table 1 Related data of openness (Unit: Billion US Dollars)

Year	GDP	Commodity trade import and export	Total import and export of service trade	Absorb direct investment	Foreign direct investment	Central Bank's total assets (billion yuan)	Central Bank's foreign net assets (billion yuan)	Total securities investment	Total Other investment
1985	3052.6	696.0	51.9	19.6	6.3	273.23	14.57	20.27	18.56
1986	2954.8	606.3	56.4	18.8	4.5	310.77	15.48	16.48	36.07
1987	3213.9	711.3	65.2	23.1	6.5	372.73	21.17	13.31	32.81
1988	4010.7	874.2	80.2	31.9	8.5	451.46	24.45	15.56	60.93
1989	4491.0	1116.8	79.7	33.9	7.8	563.80	36.21	4.6	17.48
1990	3877.7	1154.4	98.1	34.9	8.3	830.47	79.60	2.41	61.98
1991	4061.0	1357.0	107.3	43.5	9.1	777.45	169.96	8.95	46.5
1992	4830.5	1655.3	182.4	108.9	40.0	935.16	133.04	8.43	73.49
1993	4018.5	1957.0	224.9	274.7	44.0	1266.80	145.99	42.44	26.90
1994	5425.3	2366.2	319.2	337.7	20.0	1758.80	445.13	43.03	26.85
1995	7002.5	2808.6	430.7	375.2	20.0	2062.40	666.95	7.90	61.97
1996	8164.9	2898.8	429.4	417.3	21.1	2644.00	956.22	30.00	24.08
1997	8982.4	3251.6	522.3	452.6	25.6	2819.60	1066.4	87.41	459.58
1998	9463.0	3239.5	503.5	454.6	26.3	3126.76	1376.1	39.27	436.60
1999	9913.6	3606.3	571.3	403.2	23.7	3534.98	1485.75	112.34	282.50
2000	10807.4	4742.9	660.0	407.2	22.4	3939.54	1558.28	186.24	561.93
2001	11757.3	5096.5	719.2	468.8	68.84	4254.06	1986.04	219.03	247.47
2002	12706.6	6207.7	754.6	527.4	27.5	5110.76	2324.29	138.47	41.07
2003	14182.7	8509.9	1012.3	535.1	29.0	6200.41	3114.18	114.27	299.62
2004	16537.	11545.	1336.6	606.3	55.1	7865.53	4696.0	196.90	379.08

Source: "2004 China Statistical Yearbook" "Monetary Administration's Balance Sheet" compiled.

Table 2 China's economic growth rate, trade openness, foreign capital openness, financial openness, and openness to the outside world (unit: %)

Years	Economic growth rate	Trade openness	Openness of foreign investment	Financial openness	Openness to the outside world
1985	13.5	24.50	0.85	3.30	9.55
1986	8.9	22.43	0.79	3.38	8.87
1987	11.6	24.16	0.92	3.56	9.55
1988	11.3	23.80	1.01	3.66	9.49
1989	4.1	26.64	0.92	3.46	10.34
1990	3.8	32.30	1.11	5.62	13.01
1991	9.2	36.06	1.29	11.53	16.29
1992	14.2	38.06	3.08	7.96	16.36
1993	14.0	54.30	7.93	6.62	22.95
1994	13.1	49.49	6.59	13.30	23.13
1995	10.9	46.26	5.65	16.67	22.86
1996	10.0	40.80	5.37	18.41	21.53
1997	9.3	42.01	5.33	21.96	23.10
1998	7.8	39.55	5.08	24.52	23.05
1999	7.6	42.14	4.31	23.01	23.15
2000	8.4	50.00	3.99	23.24	25.74
2001	8.3	49.47	4.58	25.33	26.46
2002	9.1	54.97	4.37	23.45	27.60
2003	10.0	67.14	3.97	26.57	32.55
2004	10.1	77.89	4.00	31.59	37.83

Note: The data is calculated based on the above formula and the data in Table 1.

4. MODEL ESTABLISHMENT AND REGRESSION ANALYSIS

Based on the above-mentioned selection of external openness indicators, the study of the effects of economic liberalization on economic growth not only starts from foreign trade and foreign capital, but also adds a new perspective on financial capital, so the total import and export volume and actual foreign direct investment (The sum of FDI and GDP is a good measure of the degree of regional opening to the outside world, and the application of relevant statistical analysis software to empirically analyze the relationship. The expected conclusions will be a useful guide for a rational economic open policy.

The method of empirical analysis in this paper is mainly based on the economic growth model proposed by Solow in 1956. In this model, Solow assumes a two-factor production function:

$$Y = F(K, L) = AK^{\alpha}L^{\beta} \qquad (7)$$

Among them, K is capital, L is labor force, Y is output, and α and β are the output elasticities of capital and labor, respectively. From formula (7), we can see that in the Solow model, FDI and domestic capital are seen as homogeneous elements in the capital variable K, and Solow does not consider the impact of technological progress on output. In order to explain continued economic growth, it is necessary to consider external factors that have long increased factor productivity. Therefore, when the formula (7) incorporates the time factor, then:

$$Y = F(K, L, t) = e^{\gamma t}K^{\alpha}L^{\beta} \qquad (8)$$

In formula (8), where e is the base of the natural logarithm; t is the time; the rest is the same as the definition of formula (7). In fact, after the introduction of the time factor, all factors such as technological progress, changes in industrial structure, and institutional changes are attributed to the time coefficient. Therefore, it is called total factor productivity and is the growth rate of total factor productivity. Take the logarithm form of e in the formula (8), and add a random variable, you can get:

$$Y = F(K, L, t) = e^{\gamma t}K^{\alpha}L^{\beta} \qquad (9)$$

In fact, formula (9) assumes that domestic capital and foreign direct investment are homogeneous capital, which is inconsistent with China's actual economic conditions. Since the reform and opening up in 1978, the total capital used by China for investment has not only originated in China, but a considerable part of it has come from FDI. The inflow of FDI brings about advanced technology, management experience and institutional innovation in the investing countries. These intangible factors can be absorbed to a certain extent, thus affecting economic growth. Therefore, we cannot simply include FDI and domestic capital as homogeneous capital in the capital variable. Instead, FDI should be considered as a separate variable that affects China's economic growth.

Secondly, as the financial openness influencing the virtual economy, it is not considered in the formula (9). The impact of the accuracy of the results in the current period has entered the new century. The real economy in China has not only been greatly developed, but also the financial market is booming. The impact on economic growth has become increasingly apparent, so we will use it as a separate variable to influence economic growth. At the same time, the time factor t is introduced and changes accordingly.

For the sake of simplifying the analysis, assume that domestic capital is a homogeneous capital, that is, it can only be deployed in the form of capital in the domestic scope. FDI flows in the international scope in the form of capital and technology. It is different from domestic capital and is a heterogeneous capital. We can define the total capital level of a country as the weighted average of domestic capital and FDI. The mathematical form specifically states:

$$K = K_d^{\lambda}K_f^{1-\lambda} \qquad (10)$$

$$Y = f(K^d, K^f, L, f, t) = e^{\gamma t_y + f t_f}(K^d)^{\alpha\lambda}(K^f)^{\alpha(1-\lambda)}L^{\beta} \qquad (11)$$

At the same time, in order to examine the role of foreign trade in China's economic growth, we include the import and export amount T as a variable in the production function, which is the output elasticity of T. Thus we obtain the final model:

$$Y = f(K^d, K^f, L, T, f, t) = e^{\gamma t_y + f t_f}(K^d)^{\alpha\lambda}(K^f)^{\alpha(1-\lambda)}L^{\beta}T^{\theta} \qquad (12)$$

Where K, K^d and K^f represent the total capital level, domestic

capital, and FDI respectively. λ represents the weight of domestic capital in the total capital composition. After incorporating FDI as an input variable of the production function into the Cobb-Douglas production function, the financial openness f is also taken as a new factor, and it is tied to the time coefficient γ along with factors such as institutional changes, technological advances, and changes in the industrial structure, referred to as the new total factor productivity, and γ is the growth rate of total factor productivity, and f is the logarithmic form of the increase in financial openness, and is obtained by adding a random variable:

$$\text{Ln}(Y_t) = \gamma t_y + f t_f + \alpha\lambda Ln(K_t^d) + \beta\text{Ln}(L_t) + \alpha(1 - \lambda LnKtf + \theta LnTt + \mu t) \quad (13)$$

Table 3 GDP, Domestic Capital Investment, Labor Force Input, FDI and Import and Export Volume from 1985 to 2004

Years	GDP (Billion)	K^d (Billion)	L(Ten thousand people)	K^f (Billion)	T(Ten thousand people)
1985	8964.4	2494.45	49873	48.75	2066.7
1986	10202.2	3056.03	51282	64.57	2580.4
1987	11962.5	3705.72	52783	85.98	30.84.2
1988	14928.3	4635.06	54334	118.74	3821.8
1989	16909.2	4282.64	55329	127.76	4155.9
1990	18547.9	4350.18	64749	166.82	5560.1
1991	21617.8	5346.11	65491	248.39	7225.8
1992	26638.1	7457.38	66152	622.72	9119.6
1993	34634.4	11472.17	66808	1600.13	11271.0
1994	46759.4	14117.25	67455	2925.69	20381.9
1995	58478.1	16885.88	68065	3133.38	23499.9
1996	67884.6	19444.45	68950	3469.10	24133.8
1997	74462.6	21189.39	69820	3751.72	26967.2
1998	78345.2	24642.24	70637	3763.93	26849.7
1999	82067.5	26516.98	71394	3337.73	29896.2
2000	89468.1	29547.18	72085	3370.55	39273.2
2001	97314.8	33333.4	73025	3880.09	42183.3
2002	105172.3	39134.37	73740	4365.54	51378.2
2003	117251.9	51138.00	74432	4428.61	70483.5
2004	159878.0	65054.65	75052	5018.35	95582.80

Sources of data: China Statistical Yearbook and the National Bureau of Statistics website

Using the statistical data of China's economy from 1985 to 2004 to regression (using Eviews software) for the model (13), the following estimation model can be obtained:

$$Ln(Y_t) = -2.1038 t_\gamma + 0.982 lt_f + 0.46107 Ln(K^d) + 0.53327 Ln(L) + 0.07538 Ln(K^f) + 0.211 Ln(T)$$

R^2 =0.9948 Adjusted- R^2 =0.9934 F-statistic=711.2
(P>F→<0.0001)

After estimating the parameters of the model, we found that after introducing the two variables of FDI and import and export volume, of the six factors affecting economic growth, at the 5% level of significance, only domestic capital investment and financial openness are significant. Each additional unit of domestic capital investment will increase GDP by 0.461 units. Every percentage point increase in financial openness will boost GDP growth by 0.98 units. The labor input is not significant. Each additional unit will increase the GDP by 0.533 units. In contrast, the amount of imports and exports and foreign direct investment are not significant. For each additional unit of the import and export volume, the GDP is increased by 0.211 units; for each additional unit of FDI, the GDP is increased by 0.075 units. Total factor productivity is very insignificant. However, from the whole model, the degree of quasi-optimization reached 0.99, and the model itself is also very significant. This shows that the six selected factors can explain China's economic growth situation well.

Through the above empirical analysis, the following basic conclusions can be drawn:
1. At present, domestic capital investment is still the primary factor in promoting China's economic growth. At the same time, China's financial level needs to be further improved in the first phase. In contrast, the current FDI amount and import

and export volume are not the main factors affecting China's economic growth.
2. Foreign trade has a slightly stronger driving effect on economic growth than FDI and financial openness.
3. The inadequacy of China's trade, finance, and exchange rate systems has distort the prices of trade products to a certain extent, hinder the effective allocation of resources through domestic price trade through foreign trade and foreign trade, and have created inadequate domestic market development and utilization. The situation of excessive dependence on trade, in addition, the unsound system also increased the transaction costs in China's foreign trade and further reduced the efficiency of foreign trade. Therefore, we must further deepen structural reforms in trade, finance, and exchange rates, reduce foreign trade transaction costs, and improve the effective distribution mechanism of resources in the domestic and international markets. At the same time, we must pay full attention to the construction of domestic consumer markets, expand the proportion of domestic consumption in GDP, implement a strategy of winning with quality, and use precious resources for domestic economic construction.

5. POLICY IMPLICATIONS

This paper uses Eviews analysis software to examine the actual effects of economic opening on China's economic growth from the perspective of foreign investment and foreign trade and the level of China's financial liberalization. The following basic conclusions are reached: At present, domestic capital investment is still driving China's economic growth. The most important factor is that the contribution of labor input to China's economic growth is not significant, while TFP, FDI, and imports and exports have little effect on China's economic growth. Based on the empirical research in this paper, we can obtain the following policy implications by further analyzing the problems in China's open economy:

1. At present, domestic capital investment is still the primary factor that promotes China's economic growth, and total factor productivity, which embodies the factor of technological progress, even has a negative correlation with GDP. The role of investment in promoting economic growth based on inputs of production factors has the nature of diminishing marginal returns, and it requires long-term economic growth rates. From the perspective of economic growth strategy, we must attach importance to the role of technological progress (The role of technological progress factors in promoting economic growth has a marginal effect. The nature of income that is constant or increasing).

2. The current role of FDI in China's economic growth is very limited. As FDI promotes a country's economic growth mainly through capital formation, technology spillovers and structural adjustment effects, given that the quantitative effect of China's foreign investment has become quite significant, to further enhance FDI's catalytic role in China's economic growth, we can start with enhanced technology spillover effects, actively guide foreign investment, selectively attract multinational corporations with strong industry linkage effects and basic science and technology development orientation to make direct investment in China, and at the same time, enhance technological attraction and strengthen the regional advantages of high-tech industrial zones.

3. There is still much room for increase in the contribution rate of financial openness to China's economic growth. China must further increase its control and direction of financial policies. Due to the unsoundness of China's trade, finance, and

exchange rate systems, the prices of trade products have been distorted to a certain extent, and resources have been hindered from effectively integrating domestic trade and foreign trade through the price mechanism. This has led to a lack of development and utilization of the domestic market and an excessive dependence of economic growth on trade. In addition, the unsound system also increased the transaction costs in China's foreign trade and further reduced the efficiency of foreign trade. Therefore, we must further deepen structural reforms in trade, finance, and exchange rates, reduce foreign trade transaction costs, and improve the effective distribution mechanism of resources in the domestic and international markets. At the same time, we must pay full attention to the construction of domestic consumer markets, expand the proportion of domestic consumption in GDP, implement a strategy of winning with quality, and use precious resources for domestic economic construction.

In addition, the role of foreign trade in promoting China's economic growth at this stage is not yet significant. Further analysis shows that: China's processing trade accounts for a large proportion, the quantitative expansion of trade structure and the adverse impact of foreign trade on China's independent technological innovation, makes foreign trade increase the efficiency of factor use through technology spillover effects and thus promote the economic growth of a country. The effect is also not ideal. Specifically, we can start from the following aspects to enhance the role of foreign trade in promoting economic growth in China. (1) Strengthen the industrial linkage effect of processing trade. We will vigorously develop the processing trade of high-tech products and promote the upgrading of processing trade. (2) Encourage comparative advantage enterprises to carry out the second venture while vigorously developing competitive advantage enterprises. (3) Take effective measures to protect and cultivate the independent innovation capabilities of Chinese enterprises and eliminate the negative impact of foreign trade on China's technological innovation

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