Determinants of Economic Growth in China

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Abstract

China is one of the strongest economies in the world which is only second to the United States. Over the past four decades, China was experiencing a fast economic growth and its rise from a developing country to a significant economic power is spectacular. The researchers try to identify main determinants of economic growth using annual data from 1982 to 2018.Multiple regression analysis using OLS method was employed to investigate the influence of each explanatory variable on the GDP per capita growth rate.

The results indicate that the education level and foreign direct investment (FDI) inflows have positive and significant impact on economic growth while population growth has imposed a negative and significant impact on growth. As results suggest, education level has played a major role in achieving higher growth rates in China. At present, 4 per cent of China's total GDP is invested in education. If the government can promote education in China, it would promote economic growth further.

This study proves that FDI inflows also have a significant positive influence on economic growth. China has imposed a number of restrictions on FDI inflows. However, according to the results of this study, if the policymakers can open up the economy to facilitate FDI inflows, it would promote economic growth in China significantly. Due to the one-child policy, China is still maintaining a very lower population growth. Due to this, China has faced a severe demographic problem of aging population. That problem has led to slow down the economic growth in China.

Keywords: Economic growth, education level, foreign direct investments, population growth, China

INTRODUCTION

China is the world's most populated country with more than 1400 million people. As well as, China has the greatest, the most attractive, and the most vigorous story out of Asian counties in terms of economic growth within the last four decades. 42 years ago, China was one of the poorest countries in the Asian continent. China's rise from a developing country to a significant economic power within four decades has been spectacular. During this period, the Gross Domestic Product (GDP) of China grew at an annual average rate of nearly 10 per cent. Within the past 35 years, China has achieved an extraordinary economic performance because of the market-oriented reforms and opening-up. At the end of 2012, China has become the world's second-largest economy by the size of GDP (nominal and PPP terms) just after the United States (US). When considering the per capita income, it reached up to US $ 6,317 in 2012 from US $195 in 1980.

1978 was the turning point of Chinese economic growth. Before 1978 China was a closed economy, and in 1978, the leader of the Chinese Communist Party, Deng Xiaoping introduced the open-door policy (free-market policy) to China. With the introduction of economic reforms, between 1953 and 1978, the estimated real annual GDP growth was 6.7 per cent, and the economy has grown considerably faster than the period during the pre-reforms. Accepting foreign direct investments, allowing entrepreneurs to start up their businesses, privatization, and removing price controls were executed under these reforms. After opening the economy, China has achieved a 9.4 per cent annual average economic growth between 1979 and 2010. Free market reforms were the foundation for the extreme economic growth in China. Chinese exports grew by 16 per cent from 1979 to 2009. This has driven China to be the county with the world's second-largest economic growth rate. There were some critical reasons for this remarkable economic growth. One of the principal reasons was that China followed a dual-track approach through which China could achieve both economic stability and the dynamic transformation, simultaneously. Secondly, China was a late-comer to the development path. Therefore, China was able to develop according to its comparative advantage and tapped into the potential advantage of backwardness. According to the World Bank's expectations, in 2030, China will be the world's largest economy (Assbring, 2012). Because of the positive influence of the trade openness, China became the world's largest exporter and the second-largest importer. As a result, it could accumulate foreign exchange reserves of US $ 3.3 trillion (Morrison, 2013). Additionally, China was ranked the first in terms of size on a purchasing power parity basis, value-added manufacturing, and merchandise trade. China has experienced the fastest sustained expansion in history and has lifted more than 1400 million people out of poverty (Assbring, 2012).

The growth miracle of China can be viewed as the most impressive, lasting, and involved in terms of institutional changes and constraint conditions in the human history of economic growth. Therefore,

it is crucial to highlight the variables which assisted in achieving that spectacular economic growth. Before 1978, China was one of the poorest countries in the world. During that period, the Chinese real GDP was one-fourteenth of the US's real GDP and one-tenth of Brazil's real GDP. At present, China is maintaining a higher GDP growth rate, with average GDP growth exceeding 8 per cent per year. Therefore, the Chinese real GDP is one-fifth of the US's real GDP and similar to Brazil. This rapid economic growth and higher standard of living were achieved by China, with 12 per cent of the world population. Therefore, the broad objective of this study is to investigate the main determinants that have caused the fast economic growth in China.

LITERATURE SURVEY

In order to identify the key determinants of the Chinese economic growth, it is important to gain an in-depth understanding about the growth determinants discussed in the theory and empirical work. This section is devoted for that purpose.

Theoretical Review

Mercantilism, Physiocracy, Classical theories, Innovative Growth theory, Keynesian theories, Neo-classical theories, and Endogenous Growth theories provide a strong theoretical background to understand the determinants of economic growth. Among them, the neo-classical model of Solow introduced by Robert Solow in 1956 is important. This is an extension of the Harrod-Domar model. This model attempt to explain the effect of the capital, labor and population growth in determining the short run level of GDP per capita, and how technological progress and human capital affect economic growth in the long run. The simplest version of this model explains the impact of capital and labor on the growth of the economy. Furthermore, this model is based on a number of assumptions i.e., constant returns to scale, diminishing marginal productivity of capital, exogenously determined technical progress and substitutability between capital and labor. This model highlights the savings or investment ratio as an important determinant of economic growth in the short run. Technological progress and substitutability between capital and labor are regarded as exogenous to the economic system and they are important in the long run. This theorization considers as the most developed growth theory that can be used when analyzing the determinants of economic growth.

Empirical Results of Previous Studies

Recently, the resurgence of interest in determinants of economic growth has led to blossoming literature. Many researchers have conducted studies in this area for different countries all around the world. However, there are only few quantitative studies that consider the determinants of economic growth in China, and most of them focus on one or two determinants only.

Assbring (2012) has conducted a study to identify determinants of economic growth in China by concerning investments, savings, GDP per capita, population growth, healthcare expenditures, and education. He has found that there is a strong positive influence of the investment, GDP per capita, and education on economic growth. Furthermore, savings, population growth, and health care were found to be adversely affecting on the growth of the country.

Wu (2000) has conducted his analysis to investigate the recent economic growth determinants in China considering capital formation, initial income, infrastructure, labor productivity, economic reforms, openness, human capital, and foreign investment. In general, this analysis has found that the growth of physical capital, infrastructure, labor productivity, human capital, and foreign investment have promoted the Chinese economic growth in the 1980s and 1990s while initial income has hindered the growth.

Esmail and Shili (2017) have investigated the role of China's structural policies in promoting its economic growth by using the variables affecting on China's economy and advancements of the economic sectors for the period between 2000 and 2017. They have found that the structural policies and the reforms adopted in agriculture, industry, trade, and financial sectors have positively impacted on China's economy and have uplifted China as an economic power.

Cuaresma *et al.* (2014) have investigated the robust determinants of economic growth in the European region. They have found that education as the most critical determinant of economic growth in the European region.

Barro (1996) has conducted a study to identify the determinants of economic growth by concerning initial schooling and life expectancy, fertility, government consumption, maintenance of the rule of law, inflation, and terms of trade. He has found that the growth has been negatively influenced by the initial level of real per capita GDP, political freedom while political rights have caused to stimulate the economic growth. In addition, a moderate level of democracy has negatively affected on the economic growth.

METHODOLOGY

This study aims to assess the determinants of economic growth in China by using the published time series data (secondary data) obtained from the World Development Indicators for the period between 1982 and 2018. To identify the main factors that have affected on the economic growth in China, this study employed an Ordinary Least Squares (OLS) multiple regression model by employing the GDP per capita growth (Assbring, 2012; Wu, 2000; Goel & Korhonen, 2011) as the dependent variable and six independent variables namely, population growth (Assbring, 2012; Levine & Renelt, 1992),

foreign direct investment inflows (Assbring, 2012; Ho & Iyke, 2018; Levine & Renelt, 1992; Ali & Saif, 2017), education level (Assbring, 2012; Levine & Renelt, 1992), savings (Assbring, 2012; Petrakos & Arvanitidis, 2008), exports (Dritsakis *et al*., 2006; Mosikari *et al*., 2016), and innovations (Assbring, 2012; Petrakos & Arvanitidis, 2008; Dritsakis *et al*., 2006). Those variables were selected based on literature support. The conceptual framework of the study can be graphically illustrated as in Figure 1.

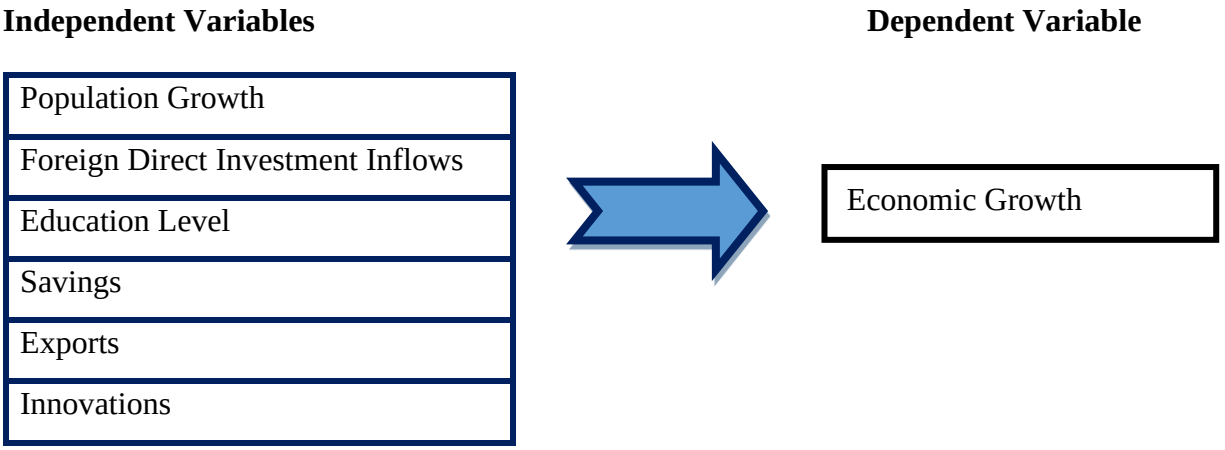

Figure 1: Conceptual Framework

Source: Authors' Compilation

The variables, abbreviations and measurements of the variables are shown in Table 1.

Table 1: Concepts, Variables, Abbreviations and Measurements of the Variables

Concept	Variable	Abbreviation	Measurement
Economic Growth	GDP Per Capita	GDPPC	US $
Labour	Population Growth	PG	Percentage
Investments	Foreign Direct Investment Inflows	FDII	Percentage of GDP
Education level	Secondary School Enrollment	EDU	Ratio of secondary enrollment, to the population of the age group
Savings	Gross National Savings	S	Percentage of GDP
Exports	Goods and Services Exports	EX	Percentage of GDP

Innovations	Number of Patent Certificate Request Applications received	INV	Number

Source: Authors Compiled

The empirical model used in this study can be specified as follows.

$$\mathbf{LnGDPPC} = \alpha_0 + \alpha_1 \mathbf{PG} + \alpha_2 \mathbf{lnFDII} + \alpha_3 \mathbf{lnEDU} + \alpha_4 \mathbf{lnS} + \alpha_5 \mathbf{lnEX} + \alpha_6 \mathbf{lnINV} + \varepsilon$$

In this study all the variables were expressed in natural logarithms to include the proliferative effect of time series, and that is symbolized as 'ln' preceding each variable name.

In addition to the OLS multiple regression model, this study used the Augmented Dickey fuller (ADF) test, Rumsey Reset test, Jargue-Bera test, Variance Inflation Factors (VIF) test, , Breusch-Pagan-Godfrey test, Durbin-Watson statistical test, and Granger causality test to checked the stationary of the variables, omitted variables, normality assumption, multicollinearity problem, heteroscedasticity problem, autocorrelation problem, and causality between the variables in the model, respectively.

ANALYSIS

Initially the data has been employed to identify the classical liner regression model assumptions namely stationary, causality, normality, multicollinearity, etc. Table 2 illustrates the descriptive summary statistics of the variables and ADF test results for the stationary of the variables.

Table 2: Descriptive Summary Statistics

Variable	Observ-ations	Mean	Standard Deviation	Minimum	Maximum	ADF Test Results	
						I (0)	I (1)
GDPPC	34	9.68	0.844	8.33	10.99	0.8964	0.0027**
PG	34	0.86	0.394	0.45	1.61	0.6328	0.0441*
FDII	34	0.92	0.672	0.62	1.82	0.0792	0.0057**
EDU	34	4.09	0.356	3.44	4.55	0.8669	0.0001**
S	34	3.74	0.129	3.56	3.95	0.3585	0.0032**
EX	34	2.99	0.359	2.12	3.58	0.5628	0.0003**
INV	34	10.84	1.984	8.15	14.03	0.9182	0.0032**

Note: *p. 0.05, **p. 0.01
Source: Authors Compiled

The analysis was started with the testing of the stationarity properties of the variables. According to the ADF test results, all the variables are stationary at the first difference.

Table 3: OLS Regression Results

	Coefficient	**Std. Error**	**T-Statistic**	**Probability**
C	0.093809	0.011371	8.249885	0.0000***
D(PG,1)	-0.026775	0.010328	-2.592479	0.0154**
D(lnFDII,1)	0.034603	0.013769	2.513135	0.0185**
D(lnEDU,1)	0.281960	0.078553	3.589423	0.0014**
D(lnS,1)	0.093819	0.106936	0.877337	0.3883
D(lnEX,1)	0.030696	0.038181	0.803955	0.4287
D(lnINV,1)	-0.011940	0.024702	-0.483337	0.6329

Note: *p. 0.1, **p. 0.05, ***p. 0.01
Source: Authors Compiled

Table 4: Overall Significance, Goodness of Fit and Validity of the Model

F-Statistic (p-value)	0.0005
R^2	0.5783
Adjusted R-Squared	0.4810
Breusch-Pagan-Godfrey Probability Chi-Square Value	0.7259
Durbin-Watson Statistic	1.7371
Jargue-Bera Statistic (p-value)	0.9399
Rumsey Reset Test (p-value)	0.7846

Source: Authors Compiled

When testing the overall model significance, p-value of the F statistics (0.0005), which is less than the 0.05, implied that the overall model is significant at 5 per cent level of significance. The R^2 value of 0.5783 depicted that the variance in the GDP per capita growth is explained by 57.83 per cent of the variance in the independent variables.

When considering the independent variables separately, EDU, FDII and PG showed significant influences on the growth rate at 5 per cent level of significance. At the same time, EDU and FDII had positive effects while PG had negatively affected on the growth.

Thus, every 1 per cent increase in EDU has led to a 28 per cent increase in the economic growth, and every 1 per cent increase in the FDII has led to a 3.5 per cent increase in the economic growth. Further, each 1 unit increase in PG has led to a 2.7 per cent reduction in the economic growth.

Moreover, this study proves that EX, S, and INV have insignificant impacts on the economic growth.

Existence of the omitted variables was tested using the Rumsey Reset test. The test statistic of 0.7846 proved that there is no omitted variable.

Normality of the variables has been tested using the Jarque-Bera test. According to the test results Jargue-Bera statistic p-value was 0. 9399. Therefore, it was concluded that all the variables error terms are normally distributed at 5 per cent level of significance.

Table 5: Results of VIF Test

Variable	D(PG,1)	D(lnFDII,1)	D(lnEDU,1)	D(lnS,1)	D(lnEX,1)	D(lnINV,1)
VIF	1.799924	1.563088	1.082902	1.872312	2.177689	1.393469

Source: Authors Compiled

This study used the VIF test to probe the multicollinearity among the independent variables. According to the centered VIF test statistics shown in Table 5, it can be conclude that there is no multicollinearity exists among the independent variables.

The Breusch-Pagan-Godefrey test has been used to test the heteroscedasticity. According to Table 4, estimated Breusch-Pagan-Godefrey Probability Chi-Square value was 0.7259. Therefore, it can be conclude that all the residuals are homoscedastic.

The Durbin-Watson test was used to ensure that the estimated model is free from the autocorrelation problem. The estimated test statistic of 1.7370 proved that there is no autocorrelation problem in this model.

To test whether there are causal relationships between variables, the Granger causality test was carried out. This study used Alkaike Information Criteria (AIC) for the lag selection. According to the test results there are only three causations between variables as shown in Table 6. However, the causality of them occurs in one direction. Accordingly, savings cause education level, education level causes population growth, and economic growth causes population growth.

Table 6: Result of Granger Causality Test

Null Hypothesis (H_0)	F-Stat	Probability	Decision
lnS does not Granger cause lnEDU	4.04300	0.0279	Reject H_0
lnEDU does not Granger cause PG	4.12701	0.0261	Reject H_0
lnGDPPC does not Granger cause PG	3.438310	0.0452	Reject H_0

Note: Rejected Null hypothesis at 5 per cent level of significance.

Source: Authors Compiled

DISCUSSION

According to the estimated model, there are significant positive impacts of EDU and FDII on the economic growth. And, there is a significant negative influence from the PG on the economic growth. According to the former empirical studies, EDU is expected to have positive impact on the economic growth. The reason behind the positive impact is, EDU has the ability to increase the human capital, which will improve the labor productivity, and consequently, it will derive a higher economic growth. Assbring (2012) also emphasized that education level positively impacts on the economic growth in China because the quality and the accessibility of the education facilities are spread all over China. Furthermore, Goel and Korhonen (2011), Wu (2000), and Petrakos and Arvanitidis (2008) also have found that there is positive impact on economic growth from EDU.

According to the Solow growth model, investments play a significant role in determining the economic growth. When considering China, they had a substantial foreign direct investment stock, and those foreign direct investments drive China to a higher economic growth. With reference to the previous studies, Assbring (2012) and Wu (2000) have concluded that foreign direct investments positively effect on the economic growth in China. Furthermore, Ali and Saif (2017), and Dritsakis *et al.* (2006) have come to the same conclusion in Pakistan and Greece, respectively.

According to Assbring (2012) there is a negative relationship between PG and economic growth in China because Chin’s birth rates have performed a substantial decline ever since the one-child policy was implemented. As a result, at present, population growth is stable, and the aging population is increasing. This has led to the reduction of economically active labor force and reduction in the productivity of the labor force. Furthermore, government expenditures on maintaining the elderly care centers and the elder's welfare cost have increased. These reasons might have caused to the negative impact of PG on the economic growth in China.

CONCLUSION AND RECOMMENDATIONS

China has become the second largest economy in the world following the US. Therefore, this study was mainly focused to investigate the determinants that have driven China towards a world leader. In this regard, this study estimated an OLS multiple regression function using a set of time series data from 1982 to 2018. The model employed the GDP per capita growth as the dependent variable and six independent variables i.e., population growth, foreign direct investment inflows, education level, exports, saving and innovation.

According to the results, it was found that there are significant positive impacts from education level and foreign direct investment on the economic growth while population growth has a significant negative impact on the economic growth.

To generate the higher economic growth in China, education level has played a major role. At present, 4 per cent of China's total GDP is invested in education. Accordingly, policymakers should pay more attention to promote technology-based education facilities within China because most of the developed countries experience the benefit of the advanced technology-based education system, and those countries are gradually converting to knowledge-based economies. Therefore, if the government can reduce the educational cost of households by offering more scholarships for local students and by affording low school fees through government intervention, it will support to promote education within China. According to the recent records in April 2019, the Ministry of Education of the People's Republic of China published that there are 492,185 international students studying in China in 2018.Thus, this information proves that international student migration to China may support to generate more foreign currency to the economy. Therefore, policymakers should take necessary actions to attract more international students to China.

Foreign direct investment is another important variable in determining economic growth in China. In the modern world, China is the world-famous giant who is promoting foreign direct investments. This study proves that foreign direct investment inflows have a significant positive influence on the economic growth. China has imposed a number of restrictions on foreign direct investment inflows. But according to the results of this study if the policymakers can open up the economy to facilitate foreign direct investment inflows, it would further accelerate the economic growth in China.

Before 1970 China has experienced a higher population growth and as a solution for that one-child policy was introduced. Due to the one-child policy, China is still maintaining a very lower population growth. The rationale behind the one-child policy is to reduce the enormous population growth. Because of that birth controlling strategy in the present context, China has faced a severe

demographic problem which is aging population. That problem has led to slow down the economic growth in China. Consequently, there is a negative influence on the economic growth from the population growth. When the aged population increases, the laboure force participation rate would decrease. At the same time, productivity of the country also would decrease. Ultimately, it adversely effects on the economic growth of the country. As a remedy for that, policymakers should introduce new policies to reduce the negative effects of aging population, such as encouraging people to work longer, introducing means-tested pension schemes, encouraging private pensions, and encouraging immigration of elderly people.

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