*IOSR Journal of Economics and Finance (IOSR-JEF)*
*e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 10, Issue 6 Ser. V (Nov. – Dec 2019), PP 08-37*
*www.iosrjournals.org*

# The Impact of Foreign Direct Investment on Economic Growth in Myanmar

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***Abstract:*** *Foreign direct investment (FDI) is generally considered as a key driver of global economic integration.FDI one of the factor that encourage the growth of the economy, especially for developing countries. Myanmar is one of the countries with emerging market and it is also in the initial stage of FDI inflows after years of closed economy. Studies have exposed that global economy has been becoming more integrated by expanding more FDI inflows and trade liberalization. This paper attempts to analyse the impact of Foreign direct investment (FDI) on economic growth in Myanmar. The study analyse time series data over the period of 1988-2017.The main type of data used in this study the secondary data: the sources from Directorate of Investment and Company Administration, Myanmar. In addition, research data will be obtained from the World Bank and Ministry of Planning and Finance(MOPF).This study used Correlation and Multiple Regression Analysis techniques, specifically the Unit root test and Johansen 's Co-integration test approach are applied to determine the relationship between and the impact of the direct Investment on economic growth in Myanmar. The results of study reveal that FDI inflow and trade openness have positive impact on economic growth. In addition, market exchange rate ,inflation rate and unemployment rate is found to have negative effect. The study recommends that government should bring reforms in the domestic market to attract more FDI in Myanmar.*

***Keywords:*** *foreign direct investment, economic growth , Myanmar*

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Date of Submission: 06-12-2019 Date of acceptance: 23-12-2019

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## I. Introduction

The inflow of FDI is significant for a country's development and there will have some aspects that influence upon FDI inflows. Many factors encourage economic growth, one of them is a foreign direct investment (FDI), especially in developing countries. Foreign Direct Investment has emerged as one of the most important sources of external resource inflows and an engine for economic development in developing countries over the 1990s. Myanmar starts opening opportunities for FDI in 1990. This paper investigates whether the FDI is one of the essential instruments to improve the growth of Myanmar economy.

Foreign direct investment is one of the important part of international trade and the main forms of modern capital internationalization. Foreign direct investment is seen as an essential component of successful international economic system and an important mechanism for development. Economists and theories believe that foreign direct investment is an important factor in the economic development of countries, especially developing countries. The developing country government attempt to promote investment and create a sound investment climate that attracts foreign investor to their countries. As a result, FDI inflows are regarded as vital components to development effort. The rapid growth of multinational corporations has become the major driver for the process of FDI because they are looking everywhere in the globe as investment center.

Myanmar as one of the developing nations in the Southeast Asia region, recognizes the important of FDI in its economic development. Foreign direct investment is a main factor for economic growth in Myanmar, because of domestic investor and government still was not strong enough for investment operation due to lack of capital, management skill, equipment, experience and technology. Thus the way to support economic growth is attracting FDI inflow. Myanmar is the most attractive investment center because of advantages in terms of lower labour cost and rich natural resources.

## II. Literature Review

### 2.1Definition of Foreign Direct Investment

Foreign direct investment generally shows that investors export capital, set up factories directly in foreign countries, set up branches, buy local enterprises, or cooperate with local governments, groups, and private companies to obtain various rights to directly operate enterprises.An investor's investment in a company outside the country to achieve lasting benefits, and economic activities that effectively influence and control the management of the foreign company. The motivations for foreign direct investment include strategic incentives

to acquire raw materials, seek knowledge, reduce costs, economies of scale, stabilize domestic customers, and economic incentives for foreign direct investment in order to take advantage of their specific advantages.
Foreign direct investment is widely accepted because it helps the affected countries to solve financial difficulties, introduce advanced technologies, expand export trade, and increase employment opportunities. At present, in order to promote the economic development of the country, most countries in the world adopt an open policy to absorb foreign direct investment, and at the same time pay attention to formulating corresponding policies and laws to protect national rights and interests.

According to the Organization for Economic Co-operation and Development (OECD) (2008)' direct investment is a category of international investment made by a resident entity in one economy(direct investor) with the objective of establishing a lasting interest in an enterprise located in an economy other than of the investor(direct investment enterprise).FDI is the occupation of a country resident and entity in another country outside the investor's country establish the long-term relationships, and control investment activities with the purpose of controlling long-term interests.

According to the definition of the International Monetary Fund(1993), FDI refers to an investment, which is made to acquire lasting interest in enterprise operating outside of the economy of the investor. The investor's purpose is to have a significant influence and to gain an effective voice in the management of the enterprise. According to the definition of the World Bank's FDI definition refers to the net inflow of investment from companies with foreign direct investment operations in economies other than investors that have sustained management rights (10% or more of voting shares).

Langviniene N., Vengrauskas P., Žitkiene R., (2004) believes that foreign direct investment is a foreign investment in production and non-production, and is the basis for long-term relationships and interests between foreign investors and enterprises. Foreign direct investment in Agiomirganakis (2003) is defined as the flow of capital resulting from the actions of transnational corporations. Therefore, factors affecting the behavior of transnational corporations will also affect the direction and scale of foreign direct investment.

**2.2Definition of Economic Growth**

Economic growth means the increase in the production of goods and services over a specific period. Growth can be measured in simply way of Growth Domestic Product (GDP) that takes into account of entire country output. Export-oriented growth strategies and FDI-driven growth strategies are functional approach for developing countries to get economic growth. As export-oriented growth, Myanmar followed a series of open-door policies in external trade and border trade from 1990 to 1998. But this is not obviously influence on growth as like other regional countries.

On the one hand, FDI increases the supply of total capital and raises the level of capital formation in a country and through the improvement of the competitive environment, positive technology introduction, external economy and the acceleration of spillover effects, FDI improves the efficiency of capital production. The benefit of FDI is conducive to accelerate the adjustment and optimization of the national industrial structure. The adjustment and optimization of industrial structure is an important and urgent task for economic development. Foreign direct investment will create a favorable international environment for its implementation of this strategic mission.

FDI is conducive to deepen the reform of the national economic system and joining the process of globalization of the world economy. FDI will promote the process of economic reform. It will promote the reform of state-owned enterprises, establish a modern enterprise system; and promote deepening institutional reforms in foreign trade, banking, insurance, securities, and commerce to meet the needs of gradual opening up in these areas. Foreign direct investment is conducive to extensive cooperation with multinational corporations, introduction of capital, technology and management experience of multinational corporations, and the use of sales channels and networks of multinational corporations to expand exports.

Therefore, attracting FDI is an important content and basic component of a country's economic development strategy. In general, FDI can impact economic growth directly and indirectly. Many research works have shown that the impact of FDI on economic growth is positive. Many Policymakers, International institutions, economists and researchers in many countries consider FDI as a major tool of the economic growth of the country.

**2.3The relationship between foreign direct investment (FDI) and economic growth**

The role of foreign direct investment (FDI) in economic growth has been extensively studied in the literature, and many scholars have studied the relationship between the two from different perspectives. Kojima (1987) pointed out that FDI can create new trade opportunities between investment and host countries to make trade on large scale. When the host country has a FDI-based "comparative advantage after the change of production function", Obviously, it will lead to an increase in the foreign trade capacity of the host country, and a complementary effect between international trade and FDI.

Foreign direct investment can be divided into: (1) participating in capital, only participating in a small amount of investment, not participating in the operation, and dispatching technical personnel and consultants as guidance when necessary. (2) start a joint venture. The two parties jointly invest and dispatch personnel with representation to participate in the operation. At present, some developing countries have legislative restrictions on the proportion of foreign investment in a joint ventures to protect their interests. (3) Buying an existing business. (4) Opening a subsidiary (or branch), funded by the head office, and opening an independent business enterprise in accordance with local laws.

De Mello(1999) pointed out that FDI has a positive direct and indirect impact on economic growth, especially in developing countries Bhagwati (1994) believes that the size and role of foreign direct investment inflows change with a country's foreign policy, that is, an export-oriented strategy (EP) or an import substitution strategy (IS). Balasubramanyam et al. (1996) confirmed that foreign direct investment plays a greater role in the economic growth of export-oriented countries than in countries that implement import substitution strategies.

Greenaway and Sapsford (1994), Since foreign direct investment, exports and economic growth are closely related, many empirical studies emphasize the link between exports and economic growth and the link between foreign direct investment and economic growth. The purpose of this study is to investigate the relationship between FDI and economic growth and to estimate the effect of FDI on growth of Myanmar over the period 1989-2018.

## III. Overview of Economic Growth and Foreign Direct Investment in Myanmar

### 3.1Background of Foreign Investment Law in Myanmar

Since 1988, Myanmar started to welcome foreign companies to invest in Myanmar. The Union Government firstly introduced the Foreign Investment Law in 1988 was apparently based on Union of Burma Investment Act 1959.After that issued the foreign Investment Law 2012 and replaced the old one. After issuing the FIL 1988, foreign investors started to invest in Myanmar. Since 2011, Myanmar has made significant reforms to improve its legal and regulatory framework in order to create an attractive business climate capable of generating more inward foreign investment.The government has embarked on an ambitious agenda to strengthen the economy, tackle poverty and promote sustainable and equitable growth and international investors including the United States are closely watching actions to further open the economy and attract investment.

Since 1988, Myanmar has officially adopted market-oriented economy and welcomed foreign investors to invest in Myanmar in order to increase FDI inflow. The Government of Myanmar need to take full advantage recent attention of FDI for further reforms to actual increase in various investments to materialize the diversified and sustainable economic development. So, Foreign Investment Commission was formed on 7 December 1988.For investing the foreign investors in Myanmar, they have to get MIC permit .Both Local and foreign investors can apply for a MIC permit. But foreign companies only providing services within Myanmar do not require a MIC permit and can start operating their business after incorporating a company according to the Myanmar Companies Act.

In addition to the 2012 foreign Investment Law (FIL),the Ministry of National Planning and Economic Development issued the 'FIL Rule' in Jannuary 2013. In Myanmar, FDI atmosphere has been covered by Myanmar Investment Law (2016), Myanmar Investment Rules (2017) and Myanmar Companies Law (2017). In government sector, Directorate of Investment and Company Administration (DICA) is one of the major departments of concerning FDI under Ministry of Investment and Foreign Economic Relations. Besides, Myanmar Investment Commission (MIC) has been founded as government appointed body for promoting and accelerating of FDI inflows according to Myanmar Investment Law. It can be confused that two bodies are serving for Myanmar's FDI factors. The basic principles of Myanmar Foreign Investment Law are as follow.

- Exploitation of natural resources which require heavy investment
- Acquisition of high technology
- Developing production and services industries involving large capital
- Creating local employment opportunities,
- Developing of works which would save energy consumption and regional investment.

DICA is accountable for to promote private sector development and boost domestic and foreign investments by creating a conductive investment climate. MIC is responsible for corroborating and approving investment proposals and issues reports and notifications about sector-specific developments. DICA is served as performing office body for the process of investment issues especially company registration. At the same time, MIC will decide important projects for national level and also FDI disputes.

Based on Myanmar Investment law, investors can invest four types of enterprises, 100% foreign investment, joint venture, contract and other investment forms like BOT (Build, Operate, Transfer) and BOO (Build, Operate, Own). There are two types of investment approval issued from MIC to investors, MIC permit and endorsement. All kinds of business which have initial investment capital exceeding USD 20 million and that

are essential to national strategy and give large impact on the local community and the environment, MIC will issue permit for that investment. Others will be issued endorsement.

An investor must also register with Directorate of Investment and Company Administration (DICA) the MIC's Secretariat except for joint ventures with state equity formed under the Special Company Act 1950.After depositing a registration, a foreign investor obtains a temporary registration certificate, valid for six months , then a Company Incorporation Certificate.

**3.2 Economic Growth in Myanmar**

Myanmar followed a series of open-door policies in external trade and border trade from 1990 to 1998. But this is not obviously influence on growth as like other regional countries. The main reason of it is suggested by Toshihiro Kudo and Satoru Kumagai that most of Myanmar's exports are at primary stage and need to diversify. It means that natural gas accounted for 40% of Myanmar's exports in 2012. Those natural resources-based exports are highly limited and can also give negative impact upon environment. Thus, Myanmar could not successfully implement this strategy as lack of capital, technology and skillful human resources. As FDI-driven growth strategy, FDI plays significant role for host countries in employment creation, value-added production, exports, wages, R & D (research & development) expenditure and so on. Thus, attracting FDI or creating FDI environment, Myanmar can access capital, technology and employments. Although FDI has relationship with economic growth from examples of other developing countries, it is difficult to say that they have strong assembly with each other. However, current situation of political and social reforms, FDI awareness will be the best way to identify policies implementation.

**Table (1)The GDP growth (annual%) of Myanmar during the period of 1988-2018**

| Year | GDP growth (Annual %) |
|---|---|
| 1988 | -11.352 |
| 1989 | 3.695 |
| 1990 | 2.817 |
| 1991 | -0.651 |
| 1992 | 9.661 |
| 1993 | 6.039 |
| 1994 | 7.478 |
| 1995 | 6.948 |
| 1996 | 6.443 |
| 1997 | 5.652 |
| 1998 | 5.866 |
| 1999 | 10.945 |
| 2000 | 13.746 |
| 2001 | 11.344 |
| 2002 | 12.026 |
| 2003 | 13.844 |
| 2004 | 13.565 |
| 2005 | 13.569 |
| 2006 | 13.076 |
| 2007 | 11.991 |
| 2008 | 10.255 |
| 2009 | 10.55 |
| 2010 | 9.635 |
| 2011 | 5.591 |
| 2012 | 7.333 |
| 2013 | 8.426 |
| 2014 | 7.991 |
| 2015 | 6.993 |
| 2016 | 5.862 |
| 2017 | 6.759 |
| 2018 | 6.2 |


**Figure(1):GDP Growth (annual%) of Myanmar during the period of (1988-2018)**
Source:World Bank Data

The GDP gowth rate (1988-2018) showed in Figure(1) , Myanmar has experienced a period of rapid GDP growth, Year of 1988 was significantly decrease than other years because of key event occured on 8 August 1988 in Myanmar and therefore it is known as the 8888 Protests Uprising. In this period , falling commodity prices and rising debt led to an economic crisis.This led to economic reforms in 1987-1988 that relaxed sociallist control and encouraged foreign investment.In 1989,GDP growth rate up to 3.659%. This rate dropped to -0.651% in 1991.In 1999-2000, GDP growth is growing up to 13.746%.During the period of 1988-2018, the maxinum GDP growth of Myanmar is 13.844%. However,during the period of 2007-2011, GDP growth rate slowed down to 5.591% . From 2012 to 2013 reaching 8.426%. In the period of 2014-2018 ,GDP growth rate slowed down to 5.862 % per year because of the impact of the global financial and economic downturn.

### 3.3 The situation of foreign direct Investment in Myanmar

After 1988, theUnion of Myanmar transformed to planned economic system into a market oriented economic system.After launching economic and social reforms in Myanmar, which become one of the passionate place for foreign investors because of high growth potential and geographical location, rich natural resources, and future economic integration with neighboring countries. Myanmar has encountered United States and EU countries' economic sanctions and functioned as close economy. In 2008, Myanmar has been declared to perform as market economy by National Referendum. Because of political changes, FDI inflows into Myanmar have also been made fluctuations. After introducing foreign Investment law, foreign direct Investment started in Myanmar from 1989 onwards.

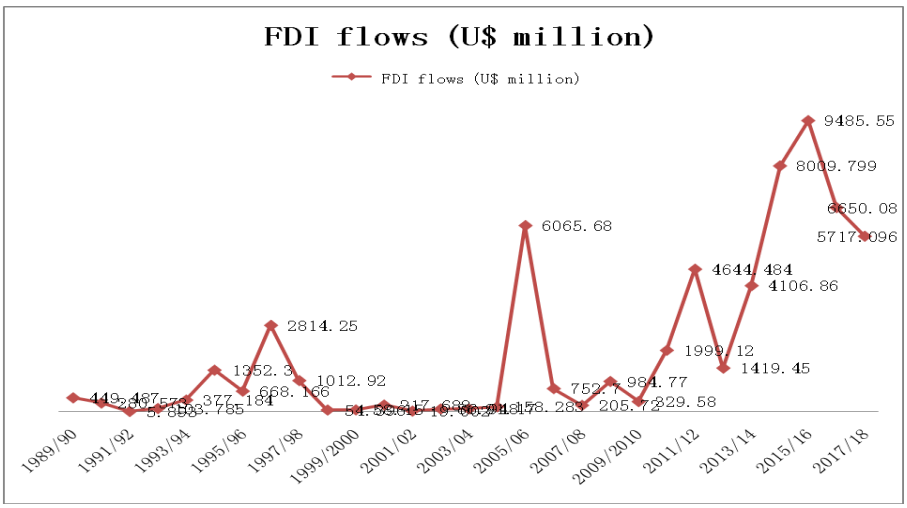



**Fig:(2) FDI inflow into Myanmar during the period of 1989/90 to 2017/2018**
Source :Myanmar Investment commission

Figure (2) is shown that the situation of the influx of foreign direct investment into Myanmar was fluctuating. after 1997,the volume of FDI inflow has dropped significantly,except in a liitle increase with $ 217.688 in 2000-2001.In 2005-2006, the amount of FDI is asending to $ 6065.68.The flow of FDI is declined by $54.396 and $ 58.15 in 1998-1999 and 1999-2000.Within 30 years, in 2015-2016, the largest amount of FDI is $ 9485.55 and in 1991-1992 ,the smallest amount of FDI is $ 5.893.

**3.4Foreign Investment Inflow in Myanmar by Economic Sector**

Myanmar is a country rich in natural and human resources. It has vast cultivable land, long coastlines, navigable river systems, abundant materials, gems, forests and a literate population. These plus attractive incentives are expected to entice potential foreign investors. Foreign investments from various counties have been coming into Myanmar since 1989. The pattern of foreign direct investment inflows into Myanmar from 2011-12 to 2017-2018 is shown as follows in Figure (1). Data in all figures represent approval data by MIC.

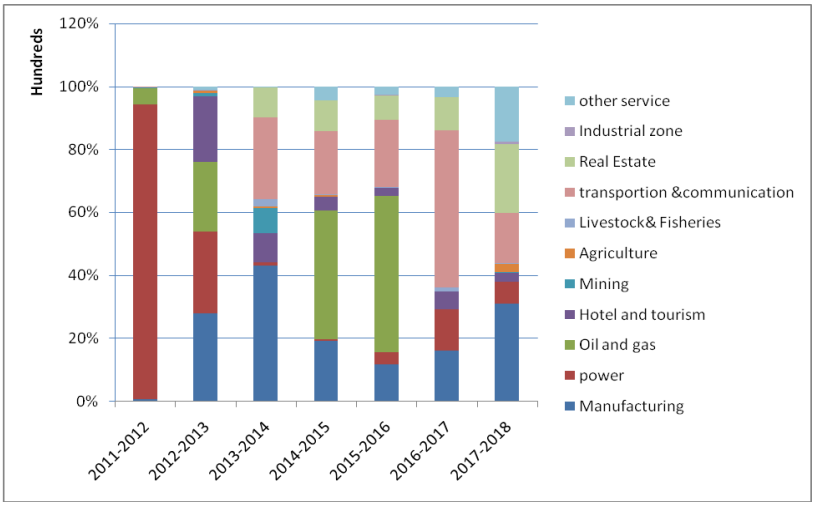



**Figure (2) FDI inflows in Myanmar by economic sector**

Source :Myanmar Investment commission

That changing shows economic reforms lead to services sector and oil and gas sector improvement. Although government is finding ways to attain significant development in agricultural sector, lack of capital and technology may give negative impact. To fulfill this requirement, FDI will become one of the solutions. FDI can create business opportunities for local small and medium enterprises (SMEs) by linking businesses with MNCs. In this part, it can be compared FDI situation before and after political reforms.

The FDI inflows into Myanmar are heavily concentrated on natural resource based and extractive industries such as power, oil and gas and mining sectors. From 1990 to 2005 total amount of FDI inflows into the country are concentrated in power sector (81.59%). The inflows into other sectors are agriculture (0.27 %), manufacturing (1.96%) and hotel and tourism (2.36%) which is relatively low because the country possesses attractive features, in terms of resources may be constrained by variety of factors such as sanctions imposed by US and EU, unfavorable exchange rates and foreign investment laws (Myanmar Statistical Year Book, 2011).

Starting from 2010, Myanmar made political reforms leading to democratic government with market economy and focus to develop the country's FDI inflows. In 2011-2012 the new foreign Investment law is recently come out and the foreign investors were waiting the situation of foreign investment. In 2011-2012, the largest sector of FDI is power sector with $4.343 billion,$0.25 billion invested into oil and gas sector. In 2012-2013 manufacturing sector $0.4 is the first largest investment sector,power sector is the second largest investment sector with $0.36 billion and oil and gas the third largest investment sector with $0.31 billion.In 2013-2014,$1.83 billion invested into manufacturing sector, $0.44 billion invested into real estate and $0.43 billion invested into hotel and tourism.

Myanmar approved foreign investment totaling US $8.01 billion from 211 companies for the 2014-2015 fiscal year across 11 sectors, according to the Directorate of Investment and Company Administration. Among the sectors attracting foreign direct investment during this fiscal year ending 31 March, oil and gas sector topped the list at $3.22 billion, followed by transport and communication with approved capital of $1.68 billion and manufacturing with $1.5 billion. The real estate sector attracted $0.78 billion while $0.36 billion was approved for the hotel and tourism sector.

According to the Directorate of Investment and Company Administration, in 2014-2015 and 2015-2016, oil and gas sector are the most attractive sector.In 2016-2017 fiscal year transport and communication with

approved capital of $ 3.48 billion. Among 11 sectors, transport and communication is the most attracted sector. The second attractive sector is manufacturing sector with $1.13 billion. In 2017-2018 fiscal year ending 31 March, Manufacturing sector attracted $1.8 billion, followed by transport and communication with approved capital of $0.90 billion. The real estate sector attracted $1.26 billion while $0.18 billion was approved for the hotel and tourism sector. The other service sector attracted $1.00.During the period of 2014 – 2016,the most attractive sector .

## IV. Methodology And Data

The study mainly focused on the attitude of foreign investor in Myanmar. Secondary data is obtained from Ministry of Planning and Finance and World Bank. Secondary sources are used to assess the impact of FDI on the economic growth of Myanmar. The study analysis time series data over the period of 1988-2017 for the following variables;economic growth(GDP), foreign direct investment(FDI),trade openness (TO) , Exchange rate(EXR), Unemployment rate (UNEMP) and inflation rate(INFL) . The main type of data used in this study the secondary data: the sources from Directorate of Investment and Company Administration, Myanmar. In addition, research data has been obtained and calculated from the World Development Indicator published by World bank and UNCTADSTAT for Myanmar and Ministry of Planning and Finance (MOPF). The main objective of this paper is to test for the direction of causality between foreign direct investment inflows (FDI) and economic growth (GDP) in the case of Myanmar.

The computer program is appropriate and necessary for empirical study; there are several programs that popular for scholar including STATA, GMM, EVIEW and other. However, in order to facilitating of this empirical study so we will employ the Eview 10 to run the regression model. The Eview 10 is useful for scholar that employed it into empirical study. The empirical study is necessary for this research because the empirical analysis will find the evidence that supports the theories and concept whether FDI inflow stimulates economic growth, gross capital formation , unemployment, exchange rate and trade openness. Because of only the empirical result through econometric techniques that can provide evidence and prove the theories and concept of FDI inflow effect economic. Since time series are being used to analyze. It is believed that most of them are not stationary. The non-stationary data will lead to spurious regression. Therefore, it is necessary to check the stableness for all variables. R. F. Engle, C. W. J. Granger, B. Y. R. F. Engle, and C. W. J. Grangeri (2017) has employed the Augment Dickey-Fuller (ADF) for unit root testing.[1]

The next step is the stationary properties of the individual series are established linear combination of the integrated series are tested for co-integration.The co-integration relation among variables is generally interpreted as their long term equilibrium. To conduct the co-integration test, this study applies the Johansen co-integration methodology .This means to tests every variable that stationery at the level I (0) or purely at the first difference I (1). The variables are employed to empirical research as shown below:

GDP: Gross Domestic Product
FDI: Foreign Direct Investment
TO: Trade Openness
EXR: Exchange rate
UNEMP: Unemployment rate
INFL: Inflation rate

**Model Specification**

To determine the relationship between foreign direct investment and economic growth in Myanmar. Solow's model of economic growth allows the determinants of economic growth to be separated into increases in inputs (labor and capital) and technical progress. Base on the theoretical model of the neoclassical and endogenous growth as Hoang et al. (2010) and Adhikary(2015),the econometric model is derived from production function framework : where Y is the total production in an economy, A denotes total factor productivity which is usually known as technology level (and its change in time), K is capital, and L is labor and α is the elasticity of output to capital.The regression model for this study is specified as follows:

$Ln(Y_t) = \beta_0 + \beta_1 Ln\ FDI_t + \beta_2 Ln\ TO_t + \beta_3 ln\ EXR + \beta_4 Ln\ UNEMP_t + \beta_5 Ln\ INFL_t + \mathcal{E}_t$

Where $\beta_0$ is constant,$\beta_1, \beta_2 \ldots\ldots\ldots + \beta_5$ are coefficient of elasticities. Ln represents the natural logarithm of the variables and $\mathcal{E}_t$ is the error term.

Y= Gross Domestic Product (Dependent Variable)
$\beta_1$ = Foreign Direct Investment
$\beta_2$=Trade Openness

[1] R. F. Engle, C. W. J. Granger, B. Y. R. F. Engle, and C. W. J. Grangeri, "CoIntegration and Error Correction : Representation , Estimation , and Testing,"
*Econometrica*, vol. 55, no. 2, pp. 251–276, 2017

$\beta_3$ = Market Exchange Rate
$\beta_4$ = Unemployment Rate
$\beta_5$ = Inflation Rate

## V. Empirical result

### 5.1 Dickey- Fuller Unit root Test

The test of the unit root of the time series is to test the stationary of the time series. If there is a unit root in the non-stationary time series, the unit root can generally be eliminated by the difference method to obtain a stationary sequence. For the time series with unit roots, it generally shows obvious memory and the persistence of fluctuations. Therefore, the unit root test is the basis for the discussion of the existence test of co-integration and the persistence of sequence fluctuations. In the economic and financial time series, it is often encountered that ρ is very close to 1, which becomes an approximate unit root phenomenon. The approximate unit root is between the stationary sequence I(0) and the single positive sequence I(1).

To test for stationary of each variable ,Augmented Dickey-Fuller (ADF) unit root test is applied to the variables in level and at the first difference. The ADF test results for the variables involved in the analysis are shown in Table 1.The Findings indicate that the null hypothesis of the presence of unit root or non-stationary has been reject for all the first difference variables specified. This shows that all variables exhibit integrated order one or I(1).This also mean that the series are non- stationary in level but stationary in first difference. Thus, the implication is that there is a possibility of having a co-integaration vector of which coefficient can directly be explained as the long- term equilibrium.

**Table1.Augmented Dickey- Fuller Unit Root Test Result**

| Variable | Level | | | | First Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Intercept | P-value | Intercept & Trend | P-value | Intercept | P-value | Intercept& Trend | P-value | Result |
| GDP | 7.818019 | 1.0000 | -0.041663 | 0.9935 | -1.771880 | 0.3860 | -5.047923** | 0.0018 | Stationary |
| FDI | -2.020889 | 0.2767 | -3.445775 | 0.0648 | -7.669996*** | 0.0000 | -7.523930*** | 0.0000 | Stationary |
| TO | 2.555491 | 1.0000 | -0.194110 | 0.9900 | -4.216509** | 0.0028 | -5.540501** | 0.0006 | Stationary |
| EXR | -4.159560** | 0.0031 | -4.45075** | 0.0078 | -7.219651*** | 0.0000 | 7.04355*** | 0.0000 | Stationary |
| UNEM | -0.791538 | 0.8061 | -2.892855 | 0.1791 | -7.671837*** | 0.0000 | -7.545257*** | 0.0000 | Stationary |
| INFL | -1.844456 | 0.3526 | -3.158048 | 0.1125 | -6.651369*** | 0.0000 | -6.5295528*** | 0.0001 | Stationary |

Source Author's calculation
Note:*,**,*** is significant level at the 10%,5% and 1% respectively .

### 5.2 Johansen Cointegration test

The Johansen tests are called the maximum eigenvalue test and the trace test. The Johansen tests are likelihood-ratio tests. There are two tests: 1. the maximum eigenvalue test, and 2. the trace test. For both test statistics, the initial Johansen test is a test of the null hypothesis. The Johansen test can be seen as a multivariate generalization of the augmented Dickey Fuller test. The generalization is the examination of linear combinations of variables for unit roots.This study used Johansen's test to examine the existence trace test and maximum eigenvalue test. Result of these test are presented in table 2 which provides the number of cointegrating vectors.

**Table 2. Johansen Cointegration Test Results**

Date: 11/13/19 Time: 15:54
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP FDI TO EXR UNEMP INFL
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| None * | 0.838281 | 122.4799 | 95.75366 | 0.0002 |
| At most 1 * | 0.693660 | 71.46690 | 69.81889 | 0.0367 |
| At most 2 | 0.476430 | 38.34122 | 47.85613 | 0.2873 |
| At most 3 | 0.319798 | 20.22285 | 29.79707 | 0.4079 |
| At most 4 | 0.244250 | 9.432597 | 15.49471 | 0.3269 |
| At most 5 | 0.055249 | 1.591338 | 3.841466 | 0.2071 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

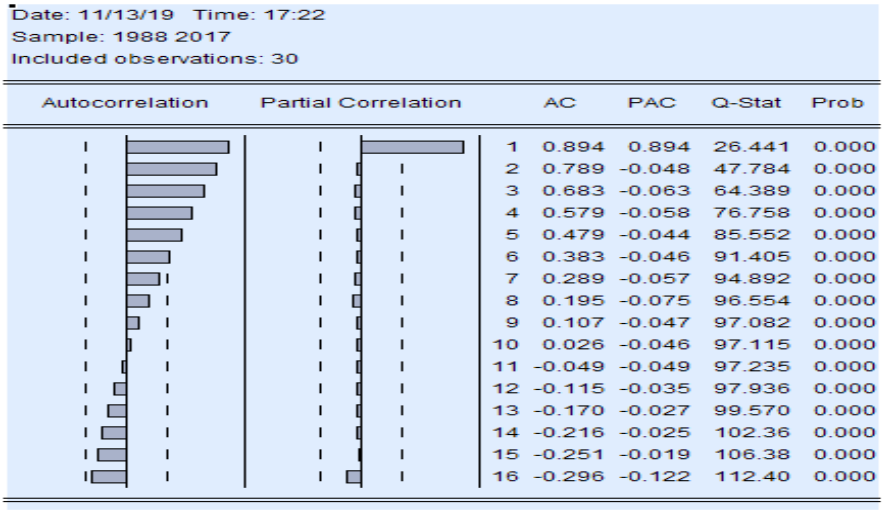
| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.838281 | 51.01303 | 40.07757 | 0.0020 |
| At most 1 | 0.693660 | 33.12568 | 33.87687 | 0.0613 |
| At most 2 | 0.476430 | 18.11837 | 27.58434 | 0.4853 |
| At most 3 | 0.319798 | 10.79025 | 21.13162 | 0.6682 |
| At most 4 | 0.244250 | 7.841258 | 14.26460 | 0.3950 |
| At most 5 | 0.055249 | 1.591338 | 3.841466 | 0.2071 |

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source Author's calculation
Note * denotes rejection of the null hypothesis at the 5% significance level.

As shown in table 2,if series are significant at most 1, the trace test(Johansen's approach) indicates the existence of 2 cointegrating and maximum eigenvalue test indicate the existence of 1 cointegrating vector at the 5% level of significance.This finding confirms that there is a long run relationship among GDP gross domestic product,FDI foreign direct investment, EXR exchange rate,TO trade openness, UNEMP unemployment and INFL inflation rate in Myanmar.

**5.3 Autocorrelation function**




**Fig(1): Autocorrelation function**

It can be seen from the figure(1) that the autocorrelation function with the increase of K and the $P_k$ decays slowly, indicating that the GDP sequence is non-stationary.It is shown that the second order difference GDP sequence is stationary.

**5.4 Regession Model Analysis**

Table .3indicates the result of the regression estimation of the model for GDP in Myanmar in the period of 1988-2017.

Dependent Variable: GDP
Method: Least Squares
Date: 11/13/19 Time: 15:08
Sample: 1988 2017
Included observations: 30

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 28.25634 | 7.258543 | 3.892839 | 0.0007 |
| FDI | 2.15E-09 | 1.04E-09 | 2.058672 | 0.0505 |
| EXR | -0.048500 | 0.024861 | -1.950890 | 0.0628 |
| TO | 0.001354 | 0.000150 | 9.029367 | 0.0000 |
| UNEMP | -10.64370 | 5.274841 | -2.017824 | 0.0549 |
| INFL | -1.197204 | 0.347716 | -3.443052 | 0.0021 |

| | | | |
|---|---|---|---|
| R-squared | 0.976185 | Mean dependent var | 26.47473 |
| Adjusted R-squared | 0.971224 | S.D. dependent var | 18.68450 |
| S.E. of regression | 3.169539 | Akaike info criterion | 5.321906 |
| Sum squared resid | 241.1034 | Schwarz criterion | 5.602145 |
| Log likelihood | -73.82859 | Hannan-Quinn criter. | 5.411557 |
| F-statistic | 196.7575 | Durbin-Watson stat | 1.471166 |
| Prob(F-statistic) | 0.000000 | | |

Source:Author's calculation

The result regarding long term relationship between the variables are shown in table (3).From the regression findings in the table (3) above,we substitute the values in the regression equation;

$$Ln(Y_t) = \beta_0 + \beta_1 Ln\ FDI_t + \beta_2 Ln\ TO_t + \beta_3 ln\ EXR + \beta_4 Ln\ UNEMP_t + \beta_5 Ln\ INFL_t + \mathcal{E}_t$$

$$Y = 28.25634 + 2.15^{9}\ FDI + 0.001354TO - 0.048500EXR - 10.64370UNEMP - 1.197204INFL + \mathcal{E}_t$$

Where Y represent GDP ,which is dependent vareiable, the coefficient of FDI inflows and trade openness is positive and statistically significant, indicating that FDI andTO is positive effect on the gross domestic product. The values of FDI and TO, $2.15^{9}$ ,0.001354 obtained from the analysis show that there are positive impact on GDP. The finding of the data reveal that a unit increase in foreign direct investment (FDI) will lead to $2.15^{9}$ rise in GDP;one unit increase in trade openness will result in 0.001354 increase in GDP.

At 5% level of significance and 95% level of confidence, FDI had a 0.0505 level of significance and positive impact on gross domestic product GDP. Unemployment had 0.0549 level of significance, exchange rate (EXR) had 0.0628 level of significance and inflation rate(INFL) had 0.0021 level significance. They are negative impact on GDP. Trade openness (TO) had 0.0000 level of significance; so the coefficients of FDI, TO, EXR, UNEMP and INFL are statically significant. The five independent variables FDI,TO, EXR, UNEMP and INFL that were studied indicate 97.62% of the variance in GDP in Myanmar as represented by $R^2$ .It mean that other factors not include in this study contribute 2.38% of variance in the dependent variable.

## VI. Conclusion and Recommendations

The study aim to analyse the impact of foreign direct investment (FDI) on the economic growth of Myanmar .Base on the data from World Bank national accounts data, OECD National Accounts data, Ministry of Planning and Finance (MOPF) in Myanmar and Directorate of Investment and Company Administration, Myanmar (DICA) for the period 1988-2017.In this study utilized Dickey –fuller unit root test, Johansen Cointegration test and multiple regression analysis to determine the impact of FDI on the GDP of Myanmar.The impirical result reveal that FDI inflows and trade openness have positive impact on GDP whereas exchange rate, inflation rate and unemployment are found to have negatively effect on GDP. FDI,TO,EXR, UNEMP and INFL are statistically significant. We support that FDI influence on GDP in Myanmar.FDI has played an increasingly important role in the country's import and export activities. Therefore. the study recommend that the government policy makers should bring reforms in the domestic market in order to attract more FDI. Finally,this study can be further extended by analyzing the effect of FDI on economic growth , income distribution and poverty reduction in Myanmar.

## Acknowledgement

I would like to recognize and appreciate those people whose support and great help before and during my study. I would love to express my sincere thanks and gratitude to all of those people.

Firstly, I wish to express my gratitude to University of International Business and Economics (UIBE, CHINA) for giving me the opportunity to do and encouragement to conduct this paper.

Secondly, I am heartily thankful to my thesis advisor, Professor , Dr Lan Qing Xin, University of International Business and Economics (UIBE, CHINA) whose kind guidance, encouragement for providing you valuable advice, critical comments, thoughtful feedbacks and information ensuring to improve my paper.

Thirdly, I am thankful to my econometric teacher Professor Yu Jun Nian, University of International Business and Economics (UIBE, CHINA) for his Kind supervision, persistent supports, and encouragement throughout this research study, persistent supports and encouragement throughout this research study. I found his insightful criticisms useful and valuable in completing this study paper. Moreover, I would like to express my sincere thanks to four suggest reviewers for peer- review process of my paper.

Finally, I would like to say my heartily thanks to my beloved family and our friends for their support and encouragement when I was studying.I would like to express my gratitude to everyone of those who helped me to finish the study .

**THWE NU WAR**
**3 NOVEMBER 2019**

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**Appendix**

(1)Regression Analysis - Estimate Equation

Dependent Variable: GDP
Method: Least Squares
Date: 11/13/19 Time: 15:08
Sample: 1988 2017
Included observations: 30

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 28.25634 | 7.258543 | 3.892839 | 0.0007 |
| FDI | 2.15E-09 | 1.04E-09 | 2.058672 | 0.0505 |
| EXR | -0.048500 | 0.024861 | -1.950890 | 0.0628 |
| TO | 0.001354 | 0.000150 | 9.029367 | 0.0000 |
| UNEMP | -10.64370 | 5.274841 | -2.017824 | 0.0549 |
| INFL | -1.197204 | 0.347716 | -3.443052 | 0.0021 |

| | | | |
|---|---|---|---|
| R-squared | 0.976185 | Mean dependent var | 26.47473 |
| Adjusted R-squared | 0.971224 | S.D. dependent var | 18.68450 |
| S.E. of regression | 3.169539 | Akaike info criterion | 5.321906 |
| Sum squared resid | 241.1034 | Schwarz criterion | 5.602145 |
| Log likelihood | -73.82859 | Hannan-Quinn criter. | 5.411557 |
| F-statistic | 196.7575 | Durbin-Watson stat | 1.471166 |
| Prob(F-statistic) | 0.000000 | | |

(2)**Johansen Cointegration Test**

Date: 11/13/19 Time: 15:54
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP FDI TO EXR UNEMP INFL
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.838281 | 122.4799 | 95.75366 | 0.0002 |
| At most 1 * | 0.693660 | 71.46690 | 69.81889 | 0.0367 |
| At most 2 | 0.476430 | 38.34122 | 47.85613 | 0.2873 |
| At most 3 | 0.319798 | 20.22285 | 29.79707 | 0.4079 |
| At most 4 | 0.244250 | 9.432597 | 15.49471 | 0.3269 |
| At most 5 | 0.055249 | 1.591338 | 3.841466 | 0.2071 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.838281 | 51.01303 | 40.07757 | 0.0020 |
| At most 1 | 0.693660 | 33.12568 | 33.87687 | 0.0613 |
| At most 2 | 0.476430 | 18.11837 | 27.58434 | 0.4853 |
| At most 3 | 0.319798 | 10.79025 | 21.13162 | 0.6682 |

| | | | | |
|---|---|---|---|---|
| At most 4 | 0.244250 | 7.841258 | 14.26460 | 0.3950 |
| At most 5 | 0.055249 | 1.591338 | 3.841466 | 0.2071 |

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 0.247007 | -1.94E-09 | -5.07E-05 | -0.028567 | 11.00576 | 0.849231 |
| -0.290979 | 1.45E-09 | 0.000187 | -0.064425 | -10.34405 | -1.020530 |
| -0.290351 | -2.18E-10 | 0.000225 | -0.009490 | -3.857966 | -0.406381 |
| 0.313874 | -7.96E-10 | -0.000520 | 0.015906 | 1.797762 | -0.122373 |
| -0.031967 | 1.13E-09 | 4.98E-05 | -0.021061 | 11.43796 | 0.019096 |
| 0.095654 | -2.36E-09 | 0.000270 | 0.027598 | 5.094464 | 0.341110 |

Unrestricted Adjustment Coefficients (alpha):

| | | | | | | |
|---|---|---|---|---|---|---|
| D(GDP) | 0.130368 | 0.474325 | -0.446536 | 0.099528 | 0.089226 | 0.062405 |
| D(FDI) | 4.60E+08 | -17670560 | 1.58E+08 | 1.04E+08 | -6291124. | 23424711 |
| D(TO) | 189.8848 | -52.06501 | -358.6122 | 422.0143 | 17.94846 | -222.5388 |
| D(EXR) | 11.13045 | 7.477376 | 2.522312 | -5.517902 | 5.284985 | -1.674575 |
| D(UNEMP) | -0.004449 | 0.006713 | 0.013978 | -0.050203 | -0.032427 | 0.003829 |
| D(INFL) | -0.376203 | 0.563217 | 0.592447 | 0.632459 | -0.194876 | -0.079154 |

1 Cointegrating Equation(s): Log likelihood -1004.659

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 1.000000 | -7.87E-09 | -0.000205 | -0.115651 | 44.55649 | 3.438089 |
| | (1.1E-09) | (0.00019) | (0.02808) | (6.10052) | (0.38358) |

Adjustment coefficients (standard error in parentheses)

| | |
|---|---|
| D(GDP) | 0.032202 |
| | (0.05182) |
| D(FDI) | 1.14E+08 |
| | (2.0E+07) |
| D(TO) | 46.90284 |
| | (72.7599) |
| D(EXR) | 2.749296 |
| | (1.07409) |
| D(UNEMP) | -0.001099 |
| | (0.00628) |
| D(INFL) | -0.092925 |
| | (0.09144) |

2 Cointegrating Equation(s): Log likelihood -988.0966

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | -0.001394 | 0.800004 | 20.08709 | 3.625913 |
| | | (0.00051) | (0.10618) | (23.4956) | (1.32327) |
| 0.000000 | 1.000000 | -150987.5 | 1.16E+08 | -3.11E+09 | 23854038 |
| | | (73968.5) | (1.5E+07) | (3.4E+09) | (1.9E+08) |

Adjustment coefficients (standard error in parentheses)

| | | |
|---|---|---|
| D(GDP) | -0.105817 | 4.33E-10 |
| | (0.06908) | (4.4E-10) |
| D(FDI) | 1.19E+08 | -0.919396 |
| | (3.2E+07) | (0.20047) |

| | | |
|---|---|---|
| D(TO) | 62.05266 | -4.45E-07 |
| | (112.343) | (7.1E-07) |
| D(EXR) | 0.573537 | -1.08E-08 |
| | (1.53212) | (9.7E-09) |
| D(UNEMP) | -0.003052 | 1.84E-11 |
| | (0.00969) | (6.2E-11) |
| D(INFL) | -0.256809 | 1.55E-09 |
| | (0.13287) | (8.4E-10) |

3 Cointegrating Equation(s): Log likelihood -979.0374

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | -0.824172 | 11.59954 | -0.638988 |
| | | | (0.15707) | (28.0334) | (1.51221) |
| 0.000000 | 1.000000 | 0.000000 | -59610777 | -4.03E+09 | -4.38E+08 |
| | | | (1.5E+07) | (2.6E+09) | (1.4E+08) |
| 0.000000 | 0.000000 | 1.000000 | -1165.001 | -6088.016 | -3059.161 |
| | | | (176.549) | (31510.5) | (1699.78) |

Adjustment coefficients (standard error in parentheses)

| | | | |
|---|---|---|---|
| D(GDP) | 0.023835 | 5.31E-10 | -1.82E-05 |
| | (0.07240) | (3.7E-10) | (4.5E-05) |
| D(FDI) | 72871643 | -0.953779 | 8826.603 |
| | (3.6E+07) | (0.18205) | (22192.5) |
| D(TO) | 166.1760 | -3.66E-07 | -0.099951 |
| | (135.815) | (6.9E-07) | (0.08404) |
| D(EXR) | -0.158819 | -1.14E-08 | 0.001401 |
| | (1.90594) | (9.7E-09) | (0.00118) |
| D(UNEMP) | -0.007111 | 1.53E-11 | 4.62E-06 |
| | (0.01208) | (6.1E-11) | (7.5E-06) |
| D(INFL) | -0.428827 | 1.42E-09 | 0.000258 |
| | (0.15439) | (7.8E-10) | (9.6E-05) |

4 Cointegrating Equation(s): Log likelihood -973.6423

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 29.47974 | 3.412148 |
| | | | | (15.2007) | (0.83009) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | -2.73E+09 | -1.45E+08 |
| | | | | (1.7E+09) | (9.5E+07) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 19186.40 | 2667.289 |
| | | | | (13092.5) | (714.959) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 21.69475 | 4.915402 |
| | | | | (27.7006) | (1.51269) |

Adjustment coefficients (standard error in parentheses)

| | | | | | |
|---|---|---|---|---|---|
| D(GDP) | 0.055075 | 4.51E-10 | -7.00E-05 | -0.028462 | |
| | (0.08558) | (3.8E-10) | (8.9E-05) | (0.01088) | |
| D(FDI) | 1.05E+08 | -1.036275 | -45040.08 | -11838605 | |
| | (4.1E+07) | (0.18213) | (42574.6) | (5181449) | |
| D(TO) | 298.6354 | -7.03E-07 | -0.319408 | 8.045692 | |
| | (153.042) | (6.8E-07) | (0.15987) | (19.4571) | |
| D(EXR) | -1.890746 | -6.98E-09 | 0.004271 | -0.911395 | |
| | (2.16532) | (9.7E-09) | (0.00226) | (0.27529) | |
| D(UNEMP) | -0.022868 | 5.53E-11 | 3.07E-05 | -0.001237 | |
| | (0.01292) | (5.8E-11) | (1.4E-05) | (0.00164) | |
| D(INFL) | -0.230314 | 9.14E-10 | -7.13E-05 | -0.021101 | |
| | (0.16576) | (7.4E-10) | (0.00017) | (0.02107) | |

5 Cointegrating Equation(s): Log likelihood -969.7217

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | FDI | TO | EXR | UNEMP | INFL |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 2.894250 |
| | | | | | (1.00384) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | -97005769 |
| | | | | | (7.7E+07) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.000000 | 2330.223 |
| | | | | | (765.428) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 | 4.534270 |
| | | | | | (1.31721) |
| 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.017568 |
| | | | | | (0.01634) |
| | | | | | |
| Adjustment coefficients (standard error in parentheses) | | | | | |
| D(GDP) | 0.052222 | 5.52E-10 | -6.55E-05 | -0.030341 | -0.549429 |
| | (0.08495) | (4.1E-10) | (8.9E-05) | (0.01122) | (2.87349) |
| D(FDI) | 1.06E+08 | -1.043403 | -45353.48 | -11706109 | 4.75E+09 |
| | (4.1E+07) | (0.19912) | (42713.3) | (5392474) | (1.4E+09) |
| D(TO) | 298.0617 | -6.82E-07 | -0.318514 | 7.667683 | 4975.877 |
| | (153.262) | (7.5E-07) | (0.16041) | (20.2512) | (5184.45) |
| D(EXR) | -2.059692 | -9.90E-10 | 0.004534 | -1.022701 | 85.95121 |
| | (2.05985) | (1.0E-08) | (0.00216) | (0.27218) | (69.6792) |
| D(UNEMP) | -0.021831 | 1.86E-11 | 2.91E-05 | -0.000554 | -0.633473 |
| | (0.01226) | (6.0E-11) | (1.3E-05) | (0.00162) | (0.41461) |
| D(INFL) | -0.224085 | 6.93E-10 | -8.10E-05 | -0.016996 | -13.34396 |
| | (0.16412) | (8.0E-10) | (0.00017) | (0.02169) | (5.55176) |

**(3)GDP (Level, Intercept)**

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | 7.818019 | 1.0000 |
| Test critical values: | 1% level | -3.679322 | |
| | 5% level | -2.967767 | |
| | 10% level | -2.622989 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 11/13/19 Time: 15:13
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP(-1) | 0.072537 | 0.009278 | 7.818019 | 0.0000 |
| C | 0.216457 | 0.281628 | 0.768589 | 0.4488 |

| | | | |
|---|---|---|---|
| R-squared | 0.693605 | Mean dependent var | 2.036552 |
| Adjusted R-squared | 0.682257 | S.D. dependent var | 1.514009 |
| S.E. of regression | 0.853427 | Akaike info criterion | 2.587360 |
| Sum squared resid | 19.66514 | Schwarz criterion | 2.681656 |
| Log likelihood | -35.51671 | Hannan-Quinn criter. | 2.616892 |
| F-statistic | 61.12143 | Durbin-Watson stat | 1.599925 |
| Prob(F-statistic) | 0.000000 | | |

**(4)GDP(Level,Trend &Intercept)**

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -0.041663 | 0.9935 |
| Test critical values: | 1% level | -4.309824 | |
| | 5% level | -3.574244 | |
| | 10% level | -3.221728 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 11/13/19 Time: 15:15
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP(-1) | -0.001082 | 0.025976 | -0.041663 | 0.9671 |
| C | -0.310919 | 0.304223 | -1.022011 | 0.3162 |
| @TREND("1988") | 0.158308 | 0.053032 | 2.985168 | 0.0061 |

| | | | |
|---|---|---|---|
| R-squared | 0.771813 | Mean dependent var | 2.036552 |
| Adjusted R-squared | 0.754260 | S.D. dependent var | 1.514009 |
| S.E. of regression | 0.750526 | Akaike info criterion | 2.361613 |
| Sum squared resid | 14.64553 | Schwarz criterion | 2.503057 |
| Log likelihood | -31.24339 | Hannan-Quinn criter. | 2.405912 |
| F-statistic | 43.97088 | Durbin-Watson stat | 1.990471 |
| Prob(F-statistic) | 0.000000 | | |

**(5)GDP(1st Difference,Intercept)**

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -1.771880 | 0.3860 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 11/13/19 Time: 15:16
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(GDP(-1)) | -0.230728 | 0.130216 | -1.771880 | 0.0881 |
| C | 0.593899 | 0.317334 | 1.871528 | 0.0726 |

| | | | |
|---|---|---|---|
| R-squared | 0.107742 | Mean dependent var | 0.142357 |
| Adjusted R-squared | 0.073425 | S.D. dependent var | 1.039508 |
| S.E. of regression | 1.000618 | Akaike info criterion | 2.907861 |
| Sum squared resid | 26.03213 | Schwarz criterion | 3.003019 |
| Log likelihood | -38.71006 | Hannan-Quinn criter. | 2.936952 |
| F-statistic | 3.139559 | Durbin-Watson stat | 2.537445 |
| Prob(F-statistic) | 0.088136 | | |

**(6)GDP(1st difference,Trend & Intercept)**

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -5.047923 | 0.0018 |
| Test critical values: | 1% level | -4.323979 | |
| | 5% level | -3.580623 | |
| | 10% level | -3.225334 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 11/13/19 Time: 15:17
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(GDP(-1)) | -1.002372 | 0.198571 | -5.047923 | 0.0000 |
| C | -0.375542 | 0.323849 | -1.159619 | 0.2572 |
| @TREND("1988") | 0.159973 | 0.035698 | 4.481217 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.505195 | Mean dependent var | 0.142357 |
| Adjusted R-squared | 0.465611 | S.D. dependent var | 1.039508 |
| S.E. of regression | 0.759900 | Akaike info criterion | 2.389698 |
| Sum squared resid | 14.43621 | Schwarz criterion | 2.532434 |
| Log likelihood | -30.45577 | Hannan-Quinn criter. | 2.433334 |
| F-statistic | 12.76249 | Durbin-Watson stat | 2.014106 |
| Prob(F-statistic) | 0.000152 | | |

**(7)FDI ,Level - Intercept**

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | t-Statistic | Prob.* |
|---|---|---|

| | | | |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -2.020889 | 0.2767 |
| Test critical values: | 1% level | -3.679322 | |
| | 5% level | -2.967767 | |
| | 10% level | -2.622989 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 11/13/19 Time: 15:21
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| FDI(-1) | -0.257469 | 0.127404 | -2.020889 | 0.0533 |
| C | 3.73E+08 | 1.87E+08 | 1.993650 | 0.0564 |

| | | | |
|---|---|---|---|
| R-squared | 0.131386 | Mean dependent var | 77857547 |
| Adjusted R-squared | 0.099215 | S.D. dependent var | 6.63E+08 |
| S.E. of regression | 6.30E+08 | Akaike info criterion | 43.42589 |
| Sum squared resid | 1.07E+19 | Schwarz criterion | 43.52019 |
| Log likelihood | -627.6754 | Hannan-Quinn criter. | 43.45542 |
| F-statistic | 4.083992 | Durbin-Watson stat | 2.448127 |
| Prob(F-statistic) | 0.053310 | | |

**(8)FDI(Level,Trend & Intercept)**

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -3.445775 | 0.0648 |
| Test critical values: | 1% level | -4.309824 | |
| | 5% level | -3.574244 | |
| | 10% level | -3.221728 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 11/13/19 Time: 15:22
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| FDI(-1) | -0.628109 | 0.182284 | -3.445775 | 0.0019 |
| C | 9855064. | 2.19E+08 | 0.045062 | 0.9644 |
| @TREND("1988") | 52530375 | 19996748 | 2.626946 | 0.0143 |

| | | | |
|---|---|---|---|
| R-squared | 0.313575 | Mean dependent var | 77857547 |
| Adjusted R-squared | 0.260773 | S.D. dependent var | 6.63E+08 |

| | | | |
|---|---|---|---|
| S.E. of regression | 5.70E+08 | Akaike info criterion | 43.25946 |
| Sum squared resid | 8.46E+18 | Schwarz criterion | 43.40090 |
| Log likelihood | -624.2621 | Hannan-Quinn criter. | 43.30375 |
| F-statistic | 5.938696 | Durbin-Watson stat | 2.076808 |
| Prob(F-statistic) | 0.007511 | | |

**(9)FDI(1st difference,Intercept)**

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.669996 | 0.0000 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI,2)
Method: Least Squares
Date: 11/13/19 Time: 15:22
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(FDI(-1)) | -1.386793 | 0.180807 | -7.669996 | 0.0000 |
| C | 1.11E+08 | 1.21E+08 | 0.915572 | 0.3683 |

| | | | |
|---|---|---|---|
| R-squared | 0.693500 | Mean dependent var | 2280718. |
| Adjusted R-squared | 0.681712 | S.D. dependent var | 1.13E+09 |
| S.E. of regression | 6.35E+08 | Akaike info criterion | 43.44421 |
| Sum squared resid | 1.05E+19 | Schwarz criterion | 43.53937 |
| Log likelihood | -606.2190 | Hannan-Quinn criter. | 43.47330 |
| F-statistic | 58.82884 | Durbin-Watson stat | 2.061133 |
| Prob(F-statistic) | 0.000000 | | |

**(10)FDI(1st difference,Trend & Intercept)**

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.523930 | 0.0000 |
| Test critical values: | 1% level | -4.323979 | |
| | 5% level | -3.580623 | |
| | 10% level | -3.225334 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI,2)

Method: Least Squares
Date: 11/13/19 Time: 15:23
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(FDI(-1)) | -1.387014 | 0.184347 | -7.523930 | 0.0000 |
| C | 1.38E+08 | 2.65E+08 | 0.521045 | 0.6069 |
| @TREND("1988") | -1777899. | 15141726 | -0.117417 | 0.9075 |

| | | | |
|---|---|---|---|
| R-squared | 0.693669 | Mean dependent var | 2280718. |
| Adjusted R-squared | 0.669163 | S.D. dependent var | 1.13E+09 |
| S.E. of regression | 6.47E+08 | Akaike info criterion | 43.51509 |
| Sum squared resid | 1.05E+19 | Schwarz criterion | 43.65783 |
| Log likelihood | -606.2113 | Hannan-Quinn criter. | 43.55873 |
| F-statistic | 28.30559 | Durbin-Watson stat | 2.061784 |
| Prob(F-statistic) | 0.000000 | | |

**(11)TO(Level,Intercept)**

Null Hypothesis: TO has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | 2.555491 | 1.0000 |
| Test critical values: | 1% level | -3.679322 | |
| | 5% level | -2.967767 | |
| | 10% level | -2.622989 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO)
Method: Least Squares
Date: 11/13/19 Time: 15:24
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TO(-1) | 0.082087 | 0.032122 | 2.555491 | 0.0166 |
| C | 352.7344 | 401.5512 | 0.878429 | 0.3875 |

| | | | |
|---|---|---|---|
| R-squared | 0.194764 | Mean dependent var | 1089.931 |
| Adjusted R-squared | 0.164940 | S.D. dependent var | 1646.105 |
| S.E. of regression | 1504.237 | Akaike info criterion | 17.53643 |
| Sum squared resid | 61093712 | Schwarz criterion | 17.63073 |
| Log likelihood | -252.2783 | Hannan-Quinn criter. | 17.56596 |
| F-statistic | 6.530532 | Durbin-Watson stat | 2.186608 |
| Prob(F-statistic) | 0.016551 | | |

**(12)TO(Level,Trend & Intercept)**

Null Hypothesis: TO has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -0.194110 | 0.9900 |
| Test critical values: | 1% level | -4.309824 | |
| | 5% level | -3.574244 | |
| | 10% level | -3.221728 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO)
Method: Least Squares
Date: 11/13/19 Time: 15:25
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TO(-1) | -0.013637 | 0.070254 | -0.194110 | 0.8476 |
| C | -455.4240 | 659.8602 | -0.690183 | 0.4962 |
| @TREND("1988") | 111.1883 | 73.01988 | 1.522713 | 0.1399 |

| | | | |
|---|---|---|---|
| R-squared | 0.260694 | Mean dependent var | 1089.931 |
| Adjusted R-squared | 0.203825 | S.D. dependent var | 1646.105 |
| S.E. of regression | 1468.798 | Akaike info criterion | 17.51997 |
| Sum squared resid | 56091523 | Schwarz criterion | 17.66142 |
| Log likelihood | -251.0396 | Hannan-Quinn criter. | 17.56427 |
| F-statistic | 4.584067 | Durbin-Watson stat | 2.173774 |
| Prob(F-statistic) | 0.019711 | | |

**(13)TO(1st Difference,Intercept)**

Null Hypothesis: D(TO) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -4.216509 | 0.0028 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO,2)
Method: Least Squares
Date: 11/13/19 Time: 15:26
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TO(-1)) | -0.859465 | 0.203833 | -4.216509 | 0.0003 |
| C | 989.2342 | 376.1651 | 2.629787 | 0.0142 |

| | | | |
|---|---|---|---|
| R-squared | 0.406107 | Mean dependent var | 137.7500 |
| Adjusted R-squared | 0.383265 | S.D. dependent var | 2138.396 |
| S.E. of regression | 1679.335 | Akaike info criterion | 17.75893 |
| Sum squared resid | 73324295 | Schwarz criterion | 17.85409 |
| Log likelihood | -246.6251 | Hannan-Quinn criter. | 17.78802 |
| F-statistic | 17.77895 | Durbin-Watson stat | 1.934334 |
| Prob(F-statistic) | 0.000265 | | |

**(14)TO(1st Difference,Trend & Intercept)**

Null Hypothesis: D(TO) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -5.540501 | 0.0006 |
| Test critical values: | 1% level | -4.323979 | |
| | 5% level | -3.580623 | |
| | 10% level | -3.225334 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO,2)
Method: Least Squares
Date: 11/13/19 Time: 15:27
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TO(-1)) | -1.121864 | 0.202484 | -5.540501 | 0.0000 |
| C | -479.6535 | 612.4531 | -0.783168 | 0.4409 |
| @TREND("1988") | 111.5388 | 39.02871 | 2.857864 | 0.0085 |

| | | | |
|---|---|---|---|
| R-squared | 0.552352 | Mean dependent var | 137.7500 |
| Adjusted R-squared | 0.516540 | S.D. dependent var | 2138.396 |
| S.E. of regression | 1486.854 | Akaike info criterion | 17.54767 |
| Sum squared resid | 55268368 | Schwarz criterion | 17.69041 |
| Log likelihood | -242.6674 | Hannan-Quinn criter. | 17.59131 |
| F-statistic | 15.42372 | Durbin-Watson stat | 2.008233 |
| Prob(F-statistic) | 0.000043 | | |

**(15)EXR(Level,Intercept)**

Null Hypothesis: EXR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | t-Statistic | Prob.* |
|---|---|---|

| | | | |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -4.159506 | 0.0031 |
| Test critical values: | 1% level | -3.679322 | |
| | 5% level | -2.967767 | |
| | 10% level | -2.622989 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR)
Method: Least Squares
Date: 11/13/19 Time: 15:27
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EXR(-1) | -0.779637 | 0.187435 | -4.159506 | 0.0003 |
| C | 11.12218 | 5.493359 | 2.024660 | 0.0529 |

| | | | |
|---|---|---|---|
| R-squared | 0.390540 | Mean dependent var | 0.086552 |
| Adjusted R-squared | 0.367967 | S.D. dependent var | 32.58307 |
| S.E. of regression | 25.90370 | Akaike info criterion | 9.413121 |
| Sum squared resid | 18117.05 | Schwarz criterion | 9.507417 |
| Log likelihood | -134.4903 | Hannan-Quinn criter. | 9.442653 |
| F-statistic | 17.30149 | Durbin-Watson stat | 1.902917 |
| Prob(F-statistic) | 0.000290 | | |

**(16) EXR(Level ,Trend & Intercept)**

Null Hypothesis: EXR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -4.450751 | 0.0078 |
| Test critical values: | 1% level | -4.339330 | |
| | 5% level | -3.587527 | |
| | 10% level | -3.229230 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR)
Method: Least Squares
Date: 11/13/19 Time: 15:28
Sample (adjusted): 1991 2017
Included observations: 27 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EXR(-1) | -1.519293 | 0.341357 | -4.450751 | 0.0002 |
| D(EXR(-1)) | 0.560472 | 0.254986 | 2.198050 | 0.0388 |
| D(EXR(-2)) | 0.295002 | 0.195632 | 1.507944 | 0.1458 |
| C | 52.21421 | 15.71136 | 3.323342 | 0.0031 |
| @TREND("1988") | -1.913218 | 0.726479 | -2.633548 | 0.0152 |

| | | | |
|---|---|---|---|
| R-squared | 0.553189 | Mean dependent var | -0.462222 |
| Adjusted R-squared | 0.471951 | S.D. dependent var | 33.57404 |
| S.E. of regression | 24.39724 | Akaike info criterion | 9.392393 |
| Sum squared resid | 13094.96 | Schwarz criterion | 9.632363 |
| Log likelihood | -121.7973 | Hannan-Quinn criter. | 9.463749 |
| F-statistic | 6.809465 | Durbin-Watson stat | 1.797357 |
| Prob(F-statistic) | 0.001004 | | |

**(17)EXR(1st Difference,Intercept)**

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.219651 | 0.0000 |
| Test critical values: | 1% level | -3.711457 | |
| | 5% level | -2.981038 | |
| | 10% level | -2.629906 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR,2)
Method: Least Squares
Date: 11/13/19 Time: 15:29
Sample (adjusted): 1992 2017
Included observations: 26 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(EXR(-1)) | -2.653959 | 0.367602 | -7.219651 | 0.0000 |
| D(EXR(-1),2) | 1.122631 | 0.272301 | 4.122757 | 0.0004 |
| D(EXR(-2),2) | 0.606610 | 0.162801 | 3.726094 | 0.0012 |
| C | -1.979759 | 5.074520 | -0.390137 | 0.7002 |

| | | | |
|---|---|---|---|
| R-squared | 0.801980 | Mean dependent var | -1.036538 |
| Adjusted R-squared | 0.774977 | S.D. dependent var | 54.52233 |
| S.E. of regression | 25.86351 | Akaike info criterion | 9.484181 |
| Sum squared resid | 14716.27 | Schwarz criterion | 9.677735 |
| Log likelihood | -119.2944 | Hannan-Quinn criter. | 9.539918 |
| F-statistic | 29.69999 | Durbin-Watson stat | 2.383767 |
| Prob(F-statistic) | 0.000000 | | |

**(18)EXR(1st Difference, Trend & Intercept)**

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.043550 | 0.0000 |
| Test critical values: | 1% level | -4.356068 | |
| | 5% level | -3.595026 | |
| | 10% level | -3.233456 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR,2)
Method: Least Squares
Date: 11/13/19 Time: 15:30
Sample (adjusted): 1992 2017
Included observations: 26 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(EXR(-1)) | -2.654246 | 0.376834 | -7.043550 | 0.0000 |
| D(EXR(-1),2) | 1.122849 | 0.279160 | 4.022237 | 0.0006 |
| D(EXR(-2),2) | 0.606748 | 0.166935 | 3.634646 | 0.0016 |
| C | -1.823047 | 12.56247 | -0.145119 | 0.8860 |
| @TREND("1988") | -0.009502 | 0.693575 | -0.013700 | 0.9892 |

| | | | |
|---|---|---|---|
| R-squared | 0.801982 | Mean dependent var | -1.036538 |
| Adjusted R-squared | 0.764264 | S.D. dependent var | 54.52233 |
| S.E. of regression | 26.47203 | Akaike info criterion | 9.561096 |
| Sum squared resid | 14716.13 | Schwarz criterion | 9.803037 |
| Log likelihood | -119.2942 | Hannan-Quinn criter. | 9.630766 |
| F-statistic | 21.26273 | Durbin-Watson stat | 2.383726 |
| Prob(F-statistic) | 0.000000 | | |

**(19)Unemp(Level,Intercept)**

Null Hypothesis: UNEMP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -0.791538 | 0.8061 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP)
Method: Least Squares
Date: 11/13/19 Time: 15:31
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| UNEMP(-1) | -0.132805 | 0.167781 | -0.791538 | 0.4361 |
| D(UNEMP(-1)) | -0.875313 | 0.271332 | -3.225986 | 0.0035 |
| C | 0.125665 | 0.174896 | 0.718511 | 0.4791 |

| | | | |
|---|---|---|---|
| R-squared | 0.364745 | Mean dependent var | -0.016750 |
| Adjusted R-squared | 0.313925 | S.D. dependent var | 0.152466 |
| S.E. of regression | 0.126287 | Akaike info criterion | -1.199560 |
| Sum squared resid | 0.398711 | Schwarz criterion | -1.056824 |
| Log likelihood | 19.79385 | Hannan-Quinn criter. | -1.155925 |
| F-statistic | 7.177142 | Durbin-Watson stat | 1.705567 |

| | |
|---|---|
| Prob(F-statistic) | 0.003442 |

**(20)Unemp(Level,Trend & Intercept)**

Null Hypothesis: UNEMP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -2.892855 | 0.1791 |
| Test critical values: | 1% level | -4.309824 | |
| | 5% level | -3.574244 | |
| | 10% level | -3.221728 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP)
Method: Least Squares
Date: 11/13/19 Time: 15:32
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| UNEMP(-1) | -0.557241 | 0.192627 | -2.892855 | 0.0076 |
| C | 0.687727 | 0.231026 | 2.976840 | 0.0062 |
| @TREND("1988") | -0.008473 | 0.003416 | -2.480498 | 0.0199 |

| | | | |
|---|---|---|---|
| R-squared | 0.272610 | Mean dependent var | -0.016172 |
| Adjusted R-squared | 0.216657 | S.D. dependent var | 0.149751 |
| S.E. of regression | 0.132540 | Akaike info criterion | -1.106173 |
| Sum squared resid | 0.456735 | Schwarz criterion | -0.964729 |
| Log likelihood | 19.03951 | Hannan-Quinn criter. | -1.061875 |
| F-statistic | 4.872126 | Durbin-Watson stat | 1.934102 |
| Prob(F-statistic) | 0.015958 | | |

**(21)Unemp(1st Difference,Intercept)**

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.671837 | 0.0000 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP,2)
Method: Least Squares
Date: 11/13/19 Time: 15:33
Sample (adjusted): 1990 2017

Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(UNEMP(-1)) | -1.947247 | 0.253818 | -7.671837 | 0.0000 |
| C | -0.011472 | 0.023736 | -0.483334 | 0.6329 |

| | | | |
|---|---|---|---|
| R-squared | 0.693602 | Mean dependent var | -0.022321 |
| Adjusted R-squared | 0.681818 | S.D. dependent var | 0.222269 |
| S.E. of regression | 0.125377 | Akaike info criterion | -1.246237 |
| Sum squared resid | 0.408703 | Schwarz criterion | -1.151079 |
| Log likelihood | 19.44731 | Hannan-Quinn criter. | -1.217146 |
| F-statistic | 58.85708 | Durbin-Watson stat | 1.764093 |
| Prob(F-statistic) | 0.000000 | | |

**(22)Unemp(1st Difference,Trend & Intercept)**

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.545257 | 0.0000 |
| Test critical values: | 1% level | -4.323979 | |
| | 5% level | -3.580623 | |
| | 10% level | -3.225334 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP,2)
Method: Least Squares
Date: 11/13/19 Time: 15:34
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(UNEMP(-1)) | -1.926463 | 0.255321 | -7.545257 | 0.0000 |
| C | 0.031507 | 0.051442 | 0.612469 | 0.5458 |
| @TREND("1988") | -0.002780 | 0.002951 | -0.942282 | 0.3551 |

| | | | |
|---|---|---|---|
| R-squared | 0.704111 | Mean dependent var | -0.022321 |
| Adjusted R-squared | 0.680440 | S.D. dependent var | 0.222269 |
| S.E. of regression | 0.125648 | Akaike info criterion | -1.209708 |
| Sum squared resid | 0.394686 | Schwarz criterion | -1.066972 |
| Log likelihood | 19.93591 | Hannan-Quinn criter. | -1.166072 |
| F-statistic | 29.74560 | Durbin-Watson stat | 1.844820 |
| Prob(F-statistic) | 0.000000 | | |

**(23)INFL(Level,Intercept)**

Null Hypothesis: INFL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -1.844456 | 0.3526 |
| Test critical values: | 1% level | -3.679322 | |
| | 5% level | -2.967767 | |
| | 10% level | -2.622989 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFL)
Method: Least Squares
Date: 11/13/19 Time: 10:33
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| INFL(-1) | -0.232960 | 0.126303 | -1.844456 | 0.0761 |
| C | 1.020254 | 0.719336 | 1.418326 | 0.1675 |

| | | | |
|---|---|---|---|
| R-squared | 0.111901 | Mean dependent var | -0.172759 |
| Adjusted R-squared | 0.079008 | S.D. dependent var | 1.766314 |
| S.E. of regression | 1.695102 | Akaike info criterion | 3.959835 |
| Sum squared resid | 77.58100 | Schwarz criterion | 4.054131 |
| Log likelihood | -55.41761 | Hannan-Quinn criter. | 3.989367 |
| F-statistic | 3.402017 | Durbin-Watson stat | 2.234788 |
| Prob(F-statistic) | 0.076115 | | |

**(24)INFL(Level,Trend and Intercept)**

Null Hypothesis: INFL has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -3.158048 | 0.1125 |
| Test critical values: | 1% level | -4.309824 | |
| | 5% level | -3.574244 | |
| | 10% level | -3.221728 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFL)
Method: Least Squares
Date: 11/13/19 Time: 10:34
Sample (adjusted): 1989 2017
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| INFL(-1) | -0.548101 | 0.173557 | -3.158048 | 0.0040 |
| C | 4.528191 | 1.581081 | 2.863984 | 0.0082 |
| @TREND("1988") | -0.126271 | 0.051698 | -2.442463 | 0.0217 |

| | | | |
|---|---|---|---|
| R-squared | 0.277644 | Mean dependent var | -0.172759 |
| Adjusted R-squared | 0.222078 | S.D. dependent var | 1.766314 |
| S.E. of regression | 1.557887 | Akaike info criterion | 3.822236 |
| Sum squared resid | 63.10234 | Schwarz criterion | 3.963680 |
| Log likelihood | -52.42242 | Hannan-Quinn criter. | 3.866534 |
| F-statistic | 4.996658 | Durbin-Watson stat | 1.993083 |
| Prob(F-statistic) | 0.014580 | | |

**(25)INFL(1st difference Intercept)**

Null Hypothesis: D(INFL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -6.651369 | 0.0000 |
| Test critical values: | 1% level | -3.689194 | |
| | 5% level | -2.971853 | |
| | 10% level | -2.625121 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFL,2)
Method: Least Squares
Date: 11/13/19 Time: 10:35
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(INFL(-1)) | -1.264383 | 0.190094 | -6.651369 | 0.0000 |
| C | -0.225914 | 0.336445 | -0.671473 | 0.5078 |

| | | | |
|---|---|---|---|
| R-squared | 0.629844 | Mean dependent var | 0.032607 |
| Adjusted R-squared | 0.615608 | S.D. dependent var | 2.852258 |
| S.E. of regression | 1.768382 | Akaike info criterion | 4.046757 |
| Sum squared resid | 81.30657 | Schwarz criterion | 4.141914 |
| Log likelihood | -54.65459 | Hannan-Quinn criter. | 4.075847 |
| F-statistic | 44.24071 | Durbin-Watson stat | 2.151257 |
| Prob(F-statistic) | 0.000000 | | |

**(26)INFL(1st difference Trend &Intercept)**

Null Hypothesis: D(INFL) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

| | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -6.529528 | 0.0001 |

| | | |
|---|---|---|
| Test critical values: | 1% level | -4.323979 |
| | 5% level | -3.580623 |
| | 10% level | -3.225334 |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFL,2)
Method: Least Squares
Date: 11/13/19 Time: 10:38
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(INFL(-1)) | -1.266748 | 0.194003 | -6.529528 | 0.0000 |
| C | -0.087348 | 0.736782 | -0.118553 | 0.9066 |
| @TREND("1988") | -0.008971 | 0.042223 | -0.212467 | 0.8335 |

| | | | |
|---|---|---|---|
| R-squared | 0.630511 | Mean dependent var | 0.032607 |
| Adjusted R-squared | 0.600952 | S.D. dependent var | 2.852258 |
| S.E. of regression | 1.801777 | Akaike info criterion | 4.116381 |
| Sum squared resid | 81.16003 | Schwarz criterion | 4.259117 |
| Log likelihood | -54.62934 | Hannan-Quinn criter. | 4.160017 |
| F-statistic | 21.33055 | Durbin-Watson stat | 2.152062 |
| Prob(F-statistic) | 0.000004 | | |

Thwe Nu War. " The Impact of Foreign Direct Investment on Economic Growth in Myanmar." IOSR Journal of Economics and Finance (IOSR-JEF) , vol. 10, no. 6, 2019, pp. 08-37.