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Gross Domisitic Investment Growth Effeects on Growth of Some Micro and Macro Variables in Jordanian Economics (1987 – 2012)

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Abstract:
This paper aims to investigates the effect of growth of GDI as dependent variable in micro and macroeconomic variables growth such as GDP , Inflation ,exchange rate ,labor force which are used as independent variables , researcher utilized of quantitative method of econometrics to satisfied the aim of this study , OLS regression , Tobit regression , and Peirs – Winston method , the data collected from many sources such as Arab unified economic report m and other sources .
result of analyses , researcher fund there is a proportional relationships between GDI growth and growth of GDP and Labor force growth , and inverse relationships between GDI growth and exchange rate changes and stability of government economic policies which considered as dummy variables , also no structural break point has been detect in analysis period 1999 up to 2012 , high volatility has been noticed on forecasting the path of GDI per time dur to many reasons their detailed is explained on paper paths .
Key word : GDI, Jordan , quantitative method, OLS , effects of growth .

1-Introduction

In this paper I have use both the capital expense of government and government privet sector investments which consists of FDI (foreign direct investment) , FPI
(foreign portfolio investment), and local residential investment all of these parts of investments are considered as GDI .

Many papers in economics attempt the economic growth and the causes of economic growth. Solow (1956) discussed the large difference in income levels between countries has been caused due to difference in technology this means that the growth addressed the relationship between technology and growth of economic countries . World bank statistics shows that worldwide GDI grew on average 23.4 percent per annum between 1970-2006, the report suggested a positive relationship between GDI growth and economic, therefore we can interpret this viewpoint as; FDI is made a great effects in GDP in long –run , and both GDI and economic growth affect each other simultaneously.

Three methods have been used in this paper to insure of the GDI behavior in economic growth weather is the same effect in economic growth as positive or changed from method to another , Therefore technology provides an important link between GDI inflows and economic growth due to the exists of mutual effects , this argument generate an important assumption that there is an empirical evidence on a positive relationship between GDI inflows and host country , De mello (1999), has fund a positive relationship between FDI inflows and economic growth , also it tends to be conditional on host country characteristics such as the level of human capital , also the FDI has a level of effect on growth due to diminishing return of scale to capital . no one can sprats the effect of FDI and effect of GDI , therefore in this paper FDI is joined to gather with GDI of growth on GDP , labor force growth , other economic factors .

Many papers searched an empirical relationship between FDI and host countries economic grow, some of these papers takes into account a micro- based side , such as Keller (2004), De Mello (1999) who find a weak positive relationship between GDI and economic growth using time series and panel data with fixed estimation. .Also Bengao and Sanchez - Robles (2003) investigates the relationship between FDI and growth of economic of host country , they have used a panel data for (18) American Latin countries such as brazil .Argentina and Mexico for a period 30 years extended from 1970 to 1999, the results indicates a positive effect on economic growth, magnitude depends on host country.

Blonigen and Wang (2004) in their paper who founds an empirical evidence imply that there is scope for more research on the relationship between FDI and economic growth on the macro level , also they found a statistically significant effect of GDI on growth . Guha and Ray (2004) discussed why the initial surge of FDI in the "Tigers" (east Asian countries), this was mainly exploit the advantage of cheap labor for export oriented production , they have focused in their study on the comparative advantages of rising wages are likely to have diluted this initial advantage over time . Developing countries that have a successful scaled higher technological trajectories can be attractive distinctions for FDI that seeks to exploit local technological capabilities in

producing high- technological exports .

Carkovic and Levine (2003) , explain a support link that FDI has an exogenous positive effect on economic growth . Levine and Laoyza (2000) , and Levine, Laoyza, and beck (2000), explain in their papers that financial systems are important for productivity growth and development. L , Alfaro et al (2003) , suggest that there is a positive relationship In a host country between FDI as a share of GDP and financial development in host country. Durham (2004) , and Herezer et al (2008) , they have founder in their paper that there is no direct relationship between FDI and economic growth , were Hansen and Rand (2006) , Hsiao(2004) , are argued that fast growing countries attract little GDI .

Were the second comparative method used is Box- Jenkins to measure the behiovral effect of FDI in economic growth and to check weather the positive effect still or changed , Box and Jenkins (1970) were the first to approach the task of estimating an ARMA and ARIMA models in a systematic manner, Dale, C. et ,al (1982) argued that Box-Jenkins models provide a simple means for choosing the effective forecasting models. Box-Jenkins model is in two types. Type one is called Univariate models, which is considered the simplest model that uses only current values and past values of the variable under consideration. Chartfield and Prothero (1973) , reported that "Box – Jenkins procedure involves a subjective element which allows one to choose from a wide class of models". In addition, to their report, the advantage to be able to choose from a wide class of models rather than being restricted to one particular model is clear . Makridakis , et al (1984) concluded after a careful comparison of various forecasting techniques that " Box – Jenkins has the better performance of being able to accommodate structural changes.

In this paper I argued that technology and capital spillovers to domestic firms in Jordan provide the most important link for a positive effect from FDI on economic growth ,.also this paper investigates the effect of the FDI on export as a result of Jordan economic activities which can be damped due to potentially adverse effects on export. Also that both model gives the positive effect for FDI in economic growth.

In the second half of the 1990s Jordan suffered from a weak economic and performance , despite significant economic and trade policy reforms that emphasized private sector led export development , also Jordan suffered from a large financial imbalances during the 1980s extended to 2012 , and it is external payment situation continued to be precarious , with the recent foreign exchange shortage and a heavy reliance on balance of payments support . Foreign investment has picked up in recent years , though it maintained that the bulk of out side investment are " acquisition transactions " under the privatization program , apart from 1997, when FDI peaked at $ 361 million and comparable figure for 1999 and 2000 stood at $ 350 million in 2007 , (cenral bank of Jordan,2009). Therefore strong investor interest in the privileges offered by Jordan's qualifying industrial zones (JQIZ) , most of these investors came from EU member states , Kanaan,T (2000).

GDI inflows in the period (2000-2012) is not stable follows the political condition in this part of middle east also affected by Iraqi war , as ESCWA reports the GDI inflows dumped with 6.3% in Bahrain, Jordan , Syria, and Lebanon , therefore we can divided the periods of GDI inflows in too four sub- period , the first is (1980-1992) . the GDI inflows were sluggish and the amount too small , the growth rate not more then 3.8%and mean average is (20.227)million j.d , the second sub-period (1993- 1995) it is mean average is (55.95)million j.d and growth rate is 5.9%, the third sub-period covers(1996-2012) the statistical data shows the volume of the FDI inflows increased with 759.5 million and it is mean average is (250.166) million j.d and average of growth rate is 64.7% , were the fourth sub-period covers (2000-2012) ,the GDI inflows volume increased to (10050) million j.d , with average mean (1116.67) million and average growth rate (64.95%), this give us assign that take of period begins from 1999 of GDI inflows it reported the implementation of a set of economic structural and adjustment producers to make some evaluation and correction in the economic structure of Jordan .

This paper organized in five sections , first section organized to provide an introduction , then the second section is provided a theoretical justification for the models which used as applied in analysis to data of Jordan , third section presents the material and methodology , so forth section presents the empirical results ,and fifth section summarizes and concluded remarks of the paper.

2- Data and Methodology

The objective of analyzing economic variables of Jordanian financial data is to find the behavior of GDI in Jordan's economy, and to find the effect of GDI in economic growth, whether there is a link between GDP and GDI and other effective variables . First step of analysis has done is testing the behavior of GDI per time, this method of estimation produces results that correct for the possible heterogeneity that may a rise when we analyze the data. The simultaneity of relationships between macroeconomic

variables such as economic growth is complex, thus the simultaneous equation is better than OLS in estimation technique but not give correct estimation as OLS , therefore we use OLS method to estimate the model . also Tobit model is use to compare results, and to insure of elasticity sign of variables , in addition of that this technique used to eliminating the simultaneity bias of OLS if it available , and to achieve robust results of

analyzes the Jordan's data researcher used to testify the data and to insure of the assumption that GDI has appositive effect of growth economics used pries –Winston aalysis . then Chow test is used to insure of structural break point in data of 1999 . Also diagram of GDI per time used to support the results of analysis .

Data sources are : World Bank database for Asia 2007, Central bank of Jordan (various issues), 2001, 2003, 2008, 2009.2013. ESCWA, the economic and social commission for Asia, Arab unified economic reports (several issues).

3 – Some notes of the econometric models

1-3 : OLS :

It is single equation or multiple linear regression model , the multiple regression assumes a linear (in parameters) combination between dependent variable and a set of independent variables , the first regressor Xi_0 =1 is a constant unless otherwise specified , the model estimation is :

$GDI = a + \beta\ infl + \beta_1\ GDPgrow + \beta_2\ exchrate + \beta_3 policstab + \beta_4\ lab + et$

The important test in this method results of St / error , T- student test , the goodness of fit which can measured as:

$R^2 = 1 – SSR / SST = SSE / SST$ ……(1)

Where F – statistic can be measured if the null hypotheses is true :

$F = (SSR_{restricted} - SSR)\ J / SSR \div (N – K -1) = (R^2 - R^2_{restricted})\ J \div (1 - R^2) / (N – K - 1)$ ……(2)

2 – 3 : Tobit model : it is a statistical model proposed by James Tobin (1958) to describe the relationships between a non-negative in dependent variables. In this model , the β coefficient should not interpreted as the effect of Xi_0 on Yi as one would with a linear regression model , it can be interpreted as the combination of a change in Yi of those above the limit , weighted by the above probability of being above the limit .

3-3 : Pairs – Winsten estimator : is generalized least square (GLS) estimator and is divided from the AR (1)model for the error . and the e_t are independent and identically distributed as N ($0,\sigma^2$), the covariance matrix is :

$$\Psi = 1 / 1 – p^2 \begin{bmatrix} 1 & p & p^2 & p^{t-1} \\ P & . & p & p^{t-2} \\ . & . & . & . \\ p^{t-1} & & p^{t-2} & p^{t-3} \end{bmatrix} \quad \ldots\ldots\ldots\ldots(3)$$

the estimated model of Prais – Winsten is

$GDI = ai_{diet} + \beta + u_t$ ……..(4)

And the auxiliary regression is $Ut = rho\ u_{t-1} + e_t$ ……(5)

Then the estimated to obtain as estimator of the correlation in the residuals for t = 2 , …, n .

Prais – Winsten estimation is a procedure meant to take the serial correlation of type AR(1) in a linear model , this model leads to more efficiency as a results .this procedure makes a reasonable transformation for t = 1 in the following form :

$1-p^2y = a\ 1-p^2 + \beta_1 - p^2x_1 + 1 - p^2e_1$ ……(6)

Then the least square estimation will be done , and a recursive procedure may be used to make the estimation possible .

4 -3 : chaw test : we often use this test to check for structural break , which a series of data can often contain a structural break , this model is effect uses an F –test to determine whether a single regression is more efficient than two separate regressions involving splinting the data in the two sub – samples .we can summarize the procedure of F – test :

$F\text{- test} = (RSS_1 – RSS_2) / k \div RSS_2 / n - 2k$ ……(7)

Then we can conclude the null hypotheses is that there is no structural break .

4 – empirical results

1 - 4 : In analysis time series : the researcher faced two common problems with regression assumptions are heteroscadectity and autocorrelation of the error terms. First problem is heteroscadicticity it means that presence of serial correlation between term errors of data , in this paper researcher have used Breuch – Godfery – Bagan test , the test results suggested absence of hetreoscadicticity between term errors according , table (1) results . other problem is autocorrelation due to Durbin – Watson test results in table (1) , the critical value indicates that there is no serial correlation problem in term errors , also Ljung – Box test is used and modified Q- test to insure of serial correlation in error term it indicates for the null hypotheses of no autocorrelation , table (1) show the results .

The most often used diagnostic statistics test to test for normality of the residuals is Jarque – Bera test , which

measures the difference between kurtosis and skewness , in this test of abnormality data null hypotheses is rejected . then OLS should be used to regress the data.

2 – 4 : OLS analyses results as follows :

GDI = 0.37804 + 0.003 inf +0.4476 lab – 1.7394 exchrate – 0.004 policstab

In this regression all coefficients P – values gives an evidence to reject nul l hypotheses table (2) shows the results , also St /Error is too few for all coefficients , were R^2 is too small due to the data it self which present the ratio of growth of a dependent variable and independent variables , were F (0.712) and P-value of model is (0.6218) , also overall significance of the regression is reflected in the value of F- statistics which is not significance at 5% or 10 % level , thus we accept the null hypotheses , the relation between GDI and growth of : GDP , Inflation , and labor is proportional relationships, were inverse relationships between GDI and growth of Exchange rate and changes of economic policy . The results of this paper was conducted in linear form also log linear form has done as in procedure and compare the results and rejected the second method , because of the inferior results , the second reasonable reason to reject the log linear method is the nature of data micro

3 – 4 : The second model is Tobit :

In this model exchange rate has been omitted because of weak effect in the model , but also relationships still as results of OLS , the results of Tobit regression are stated in table (3) :

GDI = 0.0313286 + 0,00364 inf + 0.026 grow GDP + 0.47494 lab – 0,005716 policst

Were log likelihood is small , chi – squire is not significant , sigma is significant .

The test of residuals indicates that null hypothesis is not rejected and the arch test indicates that no arch effects is present in the time series data .

4 – 4 : Peirs – Winston :

Table (4) statistic give us assign that there is no serial correlation on the residual of the data (1.994882) , the F-test is (5,19)value reflects the insignificant of the regression which small enough to accept the null hypotheses of insignificance of all slopes coefficients (0.089905) , R^2 IS O.397, and the ST / Error of the regression is few (0.023693) . the estimated model is :

GDI = 0.086357 +0.04021 GDPgrow + 0.06578 Infl – 0.0091765 polistab
– 0.8045 Lab – 8.17145 Exchrate

The estimated model reflects the same relationships in OLS , but the relationship between labor variable and GDI is changed to become inverse .

5- 4 : Chaw test :

Chaw test has been used to analyze data at observation 1999 which indicates to end of adjustment and structural economic program , to check structural break point in this period , the F-statistics is (1.202608), the P-value of F-test is 0.371187 , this can be summarized as there is no structural breaks in this period of investments .then there is no structural breaks in the period 1999 -2012 . table (5), shows these results.

6 – 4 : forecast of GDI :

According to diagram (1) at 5percent level significance from 1987 up to 2000 most of the period less than 0.04 and dumped at the year 2000 , in 2006 the GDI ratio reach the highest level , were in 2007 it also slow down, were in 2010 rise up and on 2011and 2012 it slipped down , this volatility of GDI inflow that Jordan lied in explosive area (meadl east) , also the situation of economics in Jordan debts vs Gdp is (83%), and the cost of energy and water , also the inflation and high prices effect well in GDI inflow also the corruption in Jordan employee of government .

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Concluded remarks

This paper is considered GDI as FDI plus FDI ,FDI , FPI ,and government and privet sector in Jordan to check the effect of growth domestic investment per time on growth of economic variables as GDP ,Labor force , Exchange rate , Inflation rate , and Economic Policy stable of government . three econometric methods have been used to check that the effect by the OLS and Prais – Winsten method , and Tobit method then we use the chaw test to check whether there is structural break on data or not .

The area surrounded Jordan is fire , wars , disturbances in Iraq ,Syria ,Egypt, Wet bank and Gaza . Israel and Lebanon , also the disturbances in Jordan it self .thus the volatility is appeared in the results of analyses , and GDI is volatile per time also the effect by results , in addition to other effects of deficit of government of balance sheet , increased of government debts per time .

The results of analyses indicates that there is a positive sign of coefficients as growth of each : GDP , Inflation , and labor forces . and then a negative sign of Exchange rate and policy stable .

Also chaw test indicates that there is no structural break in data series from 1999 up to 2012. The Jordanian governments should care of budget deficit , and corruptions , change regularity law of investment , and improve the infra structure , and have a look to change the method of using technology .

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Table (1)

Breusch-Godfrey test for first-order autocorrelation

Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
uhat_1	0.0860878	0.261340	0.3294	0.7455

Test statistic: LMF = 0.108510,
with p-value = P(F(1,19) > 0.10851) = 0.745

Alternative statistic: TR^2 = 0.141966,
with p-value = P(Chi-square(1) > 0.141966) = 0.706

Ljung-Box Q' = 0.122377,
with p-value = P(Chi-square(1) > 0.122377) = 0.726

Table (2)
OLS, using observations 1987-2011 (T = 25)
Dependent variable: GDIGRO

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0313286	0.0157805	1.9853	0.06100	*
INFLATION	0.00364168	0.306978	0.0119	0.99065	
GDPGRO	0.0236604	0.029571	0.8001	0.43304	
POLITSTAB	-0.00516775	0.0122926	-0.4204	0.67868	
LABFOR	0.474992	0.432077	1.0993	0.28469	

Mean dependent var	0.043023	S.D. dependent var	0.026840
Sum squared resid	0.014683	S.E. of regression	0.027095
R-squared	0.150762	Adjusted R-squared	-0.019086
F(4, 20)	0.887630	P-value(F)	0.489279
Log-likelihood	57.52576	Akaike criterion	-105.0515
Schwarz criterion	-98.95714	Hannan-Quinn	-103.3612
rho	0.067049	Durbin-Watson	1.996031

LM test for autocorrelation up to order 13 -
Null hypothesis: no autocorrelation
Test statistic: LMF = 0.904404
with p-value = P(F(13,7) > 0.904404) = 0.585342

LM test for autocorrelation up to order 1 -
Null hypothesis: no autocorrelation
Test statistic: LMF = 0.10851
with p-value = P(F(1,19) > 0.10851) = 0.74545

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 5.25183
with p-value = 0.0723737

Table (3)
Tobit, using observations 1987-2011 (T = 25)
Dependent variable: GDIGRO
Standard errors based on Hessian

	Coefficient	*Std. Error*	*z*	*p-value*	
const	0.0313286	0.0141145	2.2196	0.02645	**
INFLATION	0.00364168	0.274569	0.0133	0.98942	
GDPGRO	0.0236604	0.0264491	0.8946	0.37102	
POLITSTAB	-0.00516775	0.0109948	-0.4700	0.63834	
LABFOR	0.474992	0.386461	1.2291	0.21904	

Chi-square(4)	4.438152	p-value	0.349944
Log-likelihood	57.52576	Akaike criterion	-103.0515
Schwarz criterion	-95.73826	Hannan-Quinn	-101.0231

sigma = 0.0242347 (0.00342731)
Left-censored observations: 0
Right-censored observations: 0
Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 19.332
with p-value = 6.34021e-005

Test for ARCH of order 1 -
Null hypothesis: no ARCH effect is present
Test statistic: LM = 4.97653
with p-value = P(Chi-square(1) > 4.97653) = 0.0256935

Table (4)
Prais-Winsten, using observations 1987-2011 (T = 25)
Dependent variable: GDIGRO

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0863571	0.0239128	3.6113	0.00186	***
GDPGRO	0.0402115	0.0297906	1.3498	0.19294	
INFLATION	0.0657852	0.312829	0.2103	0.83568	
POLITSTAB	-0.00917462	0.0104763	-0.8757	0.39210	
LABFOR	-0.804505	0.363762	-2.2116	0.03944	**
EXCHRATE	-8.17146	2.61526	-3.1245	0.00558	***

Statistics based on the rho-differenced data:

Mean dependent var	0.043023	S.D. dependent var	0.026840
Sum squared resid	0.010666	S.E. of regression	0.023693
R-squared	0.389748	Adjusted R-squared	0.229155
F(5, 19)	2.261029	P-value(F)	0.089905
rho	0.109306	Durbin-Watson	1.994882

Table (5)
Augmented regression for Chow test dependent variable: GDIGRO

Mean dependent var 0.043023 S.D. dependent var 0.026840
Sum squared resid 0.008569 S.E. of regression 0.025675
R-squared 0.504359 Adjusted R-squared 0.084971
F(11, 13) 1.202608 P-value(F) 0.371187
Log-likelihood 64.25687 Akaike criterion -104.5137
Schwarz criterion -89.88722 Hannan-Quinn -100.4570
Chow test for structural break at observation 1999

F(6, 13) = 1.51485 with p-value 0.2487

Diagram (1) :