

# THE IMPACT OF FOREIGN DIRECT INVESTMENT AND TRADE ON ECONOMIC GROWTH IN IRAN: AN ARDL BOUNDS TEST APPROACH

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*The correlation between trade, FDI and economic growth in many developing nations had remained one of the greatest crucial problems in the economic scholars in current years mostly for those countries facing from unemployment issues and lack of skills and technological development. Our study evaluates this problem by applying Autoregressive Distributed Lag (ARDL) model over the span 1970 - 2007 in Iran. We have found evidence that the relationship between FDI and population is positive and statistically significant, meaning that population is mainly characterized by foreign investors, knowledge and transfer of technology, and we can see that FDI is mainly affected by skill employers in Iran. While the relationship between FDI, Trade and GDPC are positive but insignificant, it illustrates that FDI doesn't have any impact on both trade and growth rate in Iran. Our findings are similar with previous studies.*

**Keywords:** *Economic growth, FDI, Trade, ARDL and Iran.*

## 1. INTRODUCTION

FDI and Trade are famous as an essential reason in the economic development method. Trade plays a significant role of increasing skills through the importation of superior production initiation and technology. Exporters are using developed production technology and innovation either through acting as subcontractors to foreign endeavor or by international markets competition. Producers of import-substitutes face competition

from foreign companies. They are pressed to accept more capital-intensive production facilities to face the difficult competition in the developing states, where products are mainly capital intensive (Frankel and Romer, 1999). The effect of trade on economic growth can be positive and significant due to increase of physical capital and technology. Internal FDI can play a very important role by rising the supply of funds for local investment in the less developed nations. Foreign direct investment

could be encouraged and the making of thousand new opportunity jobs, improve technology transfer, and increase whole growth rate in the most developing nations. Wang and Blomstrom (1992) and Gunther (2002) have found four channels of technological spillovers from foreign companies to domestic companies, such as: competition, connection, and, imitation (i.e. also labor mobility) imitation is also known as the process of learning-by-watching impact.

Moreover, when a domestic company increases its productivity by reproducing the technology used by the international company. The presence of foreign companies makes competition with local companies. Therefore, local companies are required to use the existing economy resources more efficiently and accept new technologies (De Mello, 1997, 1999). Thus, local companies are enforced to reuse economy resources and accept new technologies (De Mello, 1997, 1999).

In addition, FDI brings the newest version of technology to the host country, this effect could be flexibility of good trained managers and workers from external company to local company (Fosfuri et al., 2001; Glass and Saggi, 2002). Moreover, Foreign

Direct Investment spillover rising from linkages may occur when foreign companies have productivity spillover effects on domestic. In the same production increasing the quantity and quality of goods and services (Borensztein et al., 1998). Most of the previous literature dealt either FDI and trade interaction on growth (see Balasubramanyam et al., 1996; Karbasi et al., 2005). However, they cannot reach a conclusive result on the correlation between trade and FDI in most of the developing countries. The economic growth increasing the impacts from FDI and trade differ from a country to another. For example, FDI and trade have a negative effect on growth (Balasubramanyam et al., 1996; Borensztein et al., 1998; Lipsey, 2000; De Mello, 1999; Xu, 2000).

Previous researcher focused on three empirical limitations. First, most of the econometric literature had discussed the impact of FDI on economic growth rather than the causality relationship between them in developing nations. Secondly, previous study had used co-integration model based on the Engle and Granger (1987) and on Johansen (1988) and Johansen and Juselius (1990). Whereas, these co-integration model its not a good way to examine when the sample size is very small (Odhiambo,

2009). Odhiambo (2009) had used the bounds testing co-integration model improved by Pesaran et al. (2001), which is more robust for a small sample. Third, previous literature mostly focused on cross-sectional data and they did not address country-specific issues (Casselli et al., 1996; Ghirmay, 2004; Odhiambo, 2009). Our study investigate the correlation between trade, FDI and growth in the case of Iran by applying ARDL model and FDI and trade are expressed as a ratio of GDP.

The rest of our paper is structured as follows. Section 2 presents a theoretical and section 3 shows an empirical literature review. Section 3 shows the applied data, while Section 4 indicates the estimation technique and the empirical study of the results. Section 5 concludes the paper.

## **2. A THEORETICAL BACKGROUND**

Theoretically, the effect of foreign direct investment (FDI) on growth is different from econometrics methods in growth methods, for example, in neo-classical model, FDI does not impact the long-term economic growth, but only it has an impact on the level of output. An exogenous growth model increase in FDI would promote the amount income

per and capita temporarily as diminishing returns would impose a limit to this growth in the long term. The effect of foreign direct investment on the long-term economic growth can occur only through technological development or improvement of the labor sector, which are both focused exogenous. The influential work of Solow growth model (1956, 1957) made the basis for numerous previous literature.

These studies concentrated on the total production function that related the economy's output to capital and labor inputs using macroeconomic series. Investment is integrated as a static part of productivity. In spite of the neoclassical method reporting the effect of technological advance on growth, it does not explore the influence of technological advance.

The determinants for the economic model was to find the effects of technological advance on growth. It is mostly concentrated on motivations that drive creation and invention, as a major key of growth (Romer, 1986, 1990; Lucas, 1988; Grossman and Helpman, 1991). The methods commonly mainly supposed constant returns to scale to inputs such as (labor and capital), the quality of skills was expected to depend on inputs, and FDI to impact growth rate via variables such as capital, human

development, and research, (Romer, 1986; Lucas, 1988).

The technology spillovers from foreign direct investment motivate long-term economic growth, but the extent to which this occurs depends mainly on the stock of human capital and the absorptive capability of companies in the host country (Borensztein et al., 1998).

The main difference between the neoclassical model and the new growth is the role of technology. Although the previous classical model assumed that technology could be exogenous, while, the other explains it should be different from different sources, such as human capital, research and development and tangible capital spending.

### **3. LITERATURE REVIEW**

Previous study mainly concentrated on the impact of trade and FDI on economic growth and generally has been argued for many countries such as developed and developing nations by applying various statistical and econometrics models with different time periods such as time series and cross sections (Balassa, 1985; Sengupta and Espana, 1994). Furthermore, Ghirmay et al. (2001) found the correlation between economic growth and exports in nineteen less developed nations by applying a

causality model. They found a long-run relationship between economic growth and exports only in twelve of the less developed countries, with the advancement of exports attracting investment and raising gross domestic product in these states. They suggested that the economic growth in East Asia is totally not the same with Southeast Asia. Moreover, By applying a bivariate model for the period from 1976 to 2003, Mamun and Nath (2004) conclude that a long-term unidirectional causality exist from exports to growth. Moreover, Boyd and Smith (1992) investigated that foreign direct investment might be impact economic growth negatively due to misallocation of economic resources in the presence of some distortions in pre-existing trade, price and others which maybe rely on a variety of cross-country regressions for testing the effect of FDI on GDP per capita.

In addition, Blomstrom et al. (1994) concluded that foreign direct investment helps economic growth when GDPC is mainly high in the host country. Borensztein et al. (1998), also found that FDI can be a significant tool of the transfer of modern technology, but it also depends on the skills in the host country, Nair-Reichert and Weinhold (2001) suggested that the correlation between foreign local investment and growth in the less

developed nations which is heterogeneous. Sadik and Bolbol (2001) investigated the effect of foreign direct investment on total factor productivity in six Arab states over the span 1978–1998.

They had explore a significant and negative effect of foreign direct investment on total factor productivity for the cases of Saudi Arabia, Tunisia and Egypt. Bashir (2001) investigated the relation between foreign direct investment and gross domestic product in six south Mediterranean nations. He found that the impact of FDI on growth is positive and statistically insignificant.

Moreover, Athukorala (2003) had applied the econometric framework of co-integration and an error correction model to explore the correlation between foreign direct investment and gross domestic product in Sri Lanka. He found that foreign direct investment has a positive impact on gross domestic product. Darrat et al. (2005) studied the effect of foreign direct investment on growth in Central and Eastern Europe, and the MENA regions by applying a panel data.

They found that foreign direct investment encourages economic growth in EU states, while the effect of foreign direct investment on growth in MENA is either non-existent or negative. Meschi (2006)

investigated the effect of foreign direct investment on growth in 14 MENA states by applying panel data methods. She concluded that the coefficient of foreign direct investment is negative.

Nicet-Chenaf and Rougier (2009) examined the correlation between economic growth and FDI in a set of MENA states and they had found that FDI has no any significant and positive impacts on economic growth, they explained that FDI might be playing an indirect role in growth through its positive impacts on the formation of human capital and international integration.

Tintin (2012) investigated the relationship between FDI and economic growth for 125 countries. He found that FDI causes increase economic growth for both developed and less developed countries.

On the other hand, the magnitudes of the effects of foreign direct investment on growth rate are non-uniform across country samples, Balasubramanyam et al. (1996) examined the relationship between trade openness and FDI in less developed states. They found that foreign direct investment has a positive and significant impact on growth in host states which have an export promoting strategy, but not in countries which have an import substitution strategy.

Baliamoune-Lutz (2004) examined the impact of FDI on economic growth in Morocco, he found a positive and a bidirectional correlation between exports and foreign direct investment. Their result shows that foreign direct investment can support exports. Using Arellano and Bond's dynamic panel data model for twenty eight Chinese provinces over the span 1978–2000, Yao (2006) found that both FDI and exports have a positive impact on growth rate. Hisarciklilar et al. (2006) investigated the correlation between FDI, economic growth and trade in some MENA states. They have found no relationship between FDI and GDP for most of the group countries.

Alaya (2006) investigated the relationship between exports, domestic investments, and human capital in the case of Morocco, Tunisia and Turkey. He concluded that the effect of FDI on growth is statistically significant and negative. He explained more about his results. First, foreign direct investment has the tendency to eradicate local investments in the sample nations. Secondly, foreign direct investment is unsteady, and the volatility of foreign direct investment is described by privatization, which becomes one

vital source of foreign direct investment for these nations. Rahman (2007) examined the impacts of FDI and exports on the real GDP of some Asian nations such as (India, Bangladesh, Pakistan, and Sri Lanka) by applying the ARDL approach. He found that, the short-run relationship exists in the case of both Bangladesh and India. In the case of Pakistan and Sri Lanka, foreign direct investment was found to exert net restrictive impacts on its real gross domestic product, and statistically insignificant.

Alalaya (2010) applied ARDL model to investigate the relationship between FDI, economic growth, trade and FDI in the case of Jordan. He concluded a unidirectional causal impact from FDI and trade to growth. Marc (2011) examined the impact of foreign direct investment on the economies of 7 south Mediterranean states such as (Egypt, Algeria, Tunisia, Jordan, Morocco, Turkey, and Syria). He found that exports and human capital are the main crucial factors in creating positive spillover impact on growth. On the other hand, the impact of foreign direct investment on economic growth is statistically significant and negative.

#### 4. DATA AND METHODOLOGY

##### The Data

**Table 1**

Variable	Description	Source
FDI	Foreign Direct Investment	WDI (2010)
GDP	Gross domestic product per Capita	WDI (2010)
TRADE	Trade	WDI (2010)
POP	Population	WDI (2010)

The four variables that have been used in this work such as Foreign Direct Investment, Gross domestic product per Capita, Trade and Population, by applying time-series data over the period 1970–2007 as shown in Table1. The data are collected from World Development Indicator (WDI).

We have started and analyzed the unit root test for the variables and we expected that the data applied in this estimation are stationary. If the results of stationary are violated, this might lead to spurious results. In examining the time-series data properties, there are several models to test the stationary, but the most important one is the Augmented Dickey–Fuller (ADF) (Dickey and Fuller, 1979, 1981) and the Phillips–Peron (PP) (Phillips and Peron, 1988) unit root tests.

#### 5. ECONOMETRIC METHODOLOGY

To investigate times series data in different order I(1) and I(0) together, Pesaran et al. (2001) recommended that, the Autoregressive distributed lag model (ARDL) to check for cointegration as is a good way and the best alternative to cointegration method for Engle-Granger (1989). Our work applies the ARDL approach to examine the short and long term correlation.

The ARDL bond testing model for co-integration can be written:

$$\Delta FDI_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta FDI_{t-i} + \sum_{i=1}^q \alpha_i \Delta GDP_{t-i} + \sum_{i=1}^r \alpha_i \Delta TRADE_{t-i} + \sum_{i=1}^s \alpha_i \Delta POP_{t-i} + b_1 FDI_{t-1} + b_2 GDP_{t-1} + b_3 TRADE_{t-1} + b_4 POP_{t-1} + \mu_t$$

Here  $\Delta$  is the first difference operator;  $\Delta FDI_t$  stands for the natural log of foreign direct investment,  $\Delta GDP$  stands for the natural log of Gross domestic product per capital,  $\Delta TRADE$  stands for the natural log of Trade,  $POP$  stands for the natural log of population and  $\mu_t$  stands for the error correction term.

The  $F$  test is applied to examine whether the long-term correlation exists between the variables through testing the significance of the lagged levels or

not. When the long-term correlation exists, the *F* test will indicate which variable should be normalized.

The null hypothesis of no cointegration amongst the variables are

$$H_0: b_{1i} = b_{2i} = b_{3i} = b_{4i} = 0$$

against the alternative hypothesis

$$H_1: b_{1i} \neq b_{2i} \neq b_{3i} \neq b_{4i} = 0$$

for  $i=1, 2, 3, 4$ .

The *F* test has a standard distribution which mainly depends on; (1) whether the variables are included in the ARDL approach are *I*(0) or *I*(1); (2) the number of independent variables; (3) whether the ARDL approach contains an intercept and a trend; and (4) the sample size of the variables. According to Narayan (2005), the rejection of the null hypothesis mainly depends on the *F*-test and the critical bound tabulated value for a very small size.

The long term correlation among the variables exists if the calculated value of *F* - statistic is bigger than the upper critical bound, and if the calculated value of *F*- statistic is smaller than the lower critical bound, the long term correlation does not exist. If the calculated value of the *F*-statistic comes in between the range of lower critical bound (LCB) and

upper critical bound (UCB), then the long term correlation is inconclusive, Mintz (1990) Hassan & Kalim, (2012). The optimal lag can be selected using the model selection criteria like Akaike Information Criterion (AIC). Narayan (2005) stated the maximum lags for small sample size is two lags.

## 6. RESULTS AND DISCUSSIONS

**Table 2** ADF and PP for unit root tests and first differences of log levels of variables.

Variables	ADF			
	Intercept	Intercept and trend	Intercept	Intercept and trend
<b>Philip-Perron</b>				Level
$\ln(FDI_t)$	-2.169854	-2.113416	-	-
			4.1	4.168
			225	889 <sup>a</sup>
			75 <sup>a</sup>	
$\ln(GDP_t)$	-2.097320	-2.071440	-	-
			2.1	2.170
			161	516
			79	
$\ln(TRADE_t)$	-2.205005	-2.361274	-	-
			2.4	2.652
			861	155
			94	
$\ln(POP_t)$	-2.604380	0.091360	-	-
			2.1	0.312
			117	468
			91	
<b>First Difference</b>				
$\ln(FDI_t)$	-	-	-	-
	4.752532	4.7	9.5690	9.406
	<sup>a</sup>	108	92 <sup>a</sup>	220 <sup>a</sup>
		19 <sup>a</sup>		
$\ln(GDP_t)$	-	-	-	-
	5.417103	5.3	5.4171	5.395
	<sup>a</sup>	905	03 <sup>a</sup>	533 <sup>a</sup>

		15		
ln( )	-	-	-	-
	5.396118	5.3	5.7465	5.618
	<sup>a</sup>	139	54 <sup>a</sup>	401 <sup>a</sup>
		24 <sup>a</sup>		
ln( )	-	-	-	-
	3.924377	4.5	4.0109	4.566
	*	731	80 <sup>a</sup>	197 <sup>a</sup>
		18 <sup>a</sup>		

<sup>a</sup> Denotes significant at 1%,

Table 2 demonstrates the aftereffect of the stationary test for PP and ADF unit root test separately in Iran. The two tests demonstrated that FDI has a unit root at level, however it winds up stationary at first distinction, which show that FDI is I (1). On the other hand, other variable are observed to be statistically significant at first distinction and in this way it demonstrates the variables are I (1). As the outcomes turned out, the variables are either I(0) or I(1), thusly suggesting that we can unquestionably apply the ARDL to this strategy as applying ARDL requires the data must be stationary at the level I(0) and first contrast I(1) (Narayan, 2005).

Also, Table 3 demonstrates the co-integration test investigation, and the presence of a long run relationship has been built up among the model's factor variables. Results clarify that the F-statistics are 4.89. The critical value stands at ten percent level. At that point, the F-statistics is higher than the basic estimation of the upper bound test, the invalid speculation of no long haul co-incorporation relationship among the factors can be basically dismissed. And the null hypothesis can easily be rejected.

**TABLE 3** Results from bound tests.

Lag	structure:					
0,0,0,2						
F-statistics	1% Critical value		5% Critical value		10% Critical value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4.8978	4.42	6.25	3.20	4.54	2.66	3.83
**	8	0	2	4	0	8
K=3, N=40						

The critical value according to Narayan (2005) (Case III: Unrestricted intercept and no trend).  
(\*\*) Significant at 5%.

Table 4 indicates the estimated coefficients of the long-term relationship which are significant for population but not significant for GDP per capita and trade openness. Population has a significant and positive effect on FDI at the 5% level. This is indicative of the growing relationship between FDI and unemployment problem in Iran, which stimulate the FDI.

The high level of unemployment in Iran, which is related with non-qualified workers characterized by low output, motivates foreign investors around the world to enter Iran. Moreover, the effect of GDP per capita and trade openness, the two variables are not significant at the 5% level. The degree of trade openness to exterior does not stimulate foreign direct investment, which makes new jobs which maybe lead to growth in Iran. Furthermore, Mello (1997) and the

OECD (2002) found that the way in which FDI impacts economic growth is likely to depend on the economic and technological progress.

**TABLE 4 LONG TERM RELATIONSHIP**

ARDL(0,0,0,2)  
selected based on AIC.

Regressors	Coefficient	t-Statistic	Probability
Constant	46.0092	0.30603	0.762
<b>LGDP<sub>it</sub></b>	3.6169	1.0002	.325
<b>LTRADE<sub>it</sub></b>	-6.7491	-	.301
		1.0521	
<b>LPOP<sub>it</sub></b>	258.2754 <sup>a</sup>	2.0770	.046

<sup>(a)</sup> Significant at 1%.

Furthermore, the results of the short-term dynamic coefficients correlated with the long-term relations are illustrated in Table 5. All variables are passes and all diagnostic tests are free in serial correlation (Durbin Watson test and Breusch–Godfrey test), heteroscedasticity (White heteroskedasticity test), and normality of errors (Jarque–Bera test). The Ramsey RESET test also recommends that the model is well stated.

**TABLE 5 Results of diagnostic tests.**

Test statistics:	x <sup>2</sup> statistic	Probability
Jarque-Bera(normality)	.063	n/a
LM test (1) correlation	.764	.789
ARCH test	.550.	.563.
Ramsey RESET	.108.	.145

test	Stable	Stable
CUSUM test	Stable	Stable
CUSUMQ test	Stable	Stable

Finally, when focusing the stability of the long-term coefficients together with the short-term dynamics, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) are used following Pesaran and Pesaran cited in Bahmani-Oskooee (2001), the stability of the regression coefficients is examined by stability tests and they can illustrate whether or not the model equation is stable over time.

This stability test is suitable in time series data, particularly when we are not sure about when structural change maybe have taken place. CUSUM and CUSUMQ statistics are plotted against the critical bound of 5% significance. According to Bahmani-Oskooee and Wing NG (2002), if the plot of these statistics remains within the critical bound of the 5% significance level, the null hypothesis (i.e. That all coefficients in the error correction model are stable) can be accepted. The plot of the cumulative sum of the recursive residual is showed in graph 1-2. As illustrated, the plot of both the CUSUM and the CUSUMQ residual are within the boundaries. That is to say that the stability of the parameters has remained within its critical bounds of parameter

stability. It is clear from both the graphs illustrated in Figure (1-2) that both the CUSUM and the CUSUMQ tests approve the stability of the long-term coefficients.

## **7. CONCLUSIONS AND POLICY IMPLICATIONS**

This study has evaluated the correlation among the series of foreign direct investment, economic is statistically insignificant. Even though most of the previous studies believe that foreign direct investment can make positive productivity for the host country, however, our work fail to confirm them, GDP per capita is the key driver of growth in Iran.

These consequences can create significant implications and suggests for policymakers in terms of Iran. It suggests that for foreign direct investment to have predicted positive effect on population, Iran will have to undertake serious reforms with clear objectives and strong suggestions. In addition, our results could be interesting for most of developing countries to learn the lesson that the attraction of foreign direct investment is vital to stimulate growth.

growth, trade openness, and population in the case of Iran for the span of 1970 – 2007. It implements an ARDL approach to co-integration to examine the existence of a long-term correlation among the above variables. The results indicate that there is cointegration among our variables stated in the model when foreign direct investment is the dependent variable. Population support FDI in the long term.

Figure 1 Cumulative sum of recursive residuals

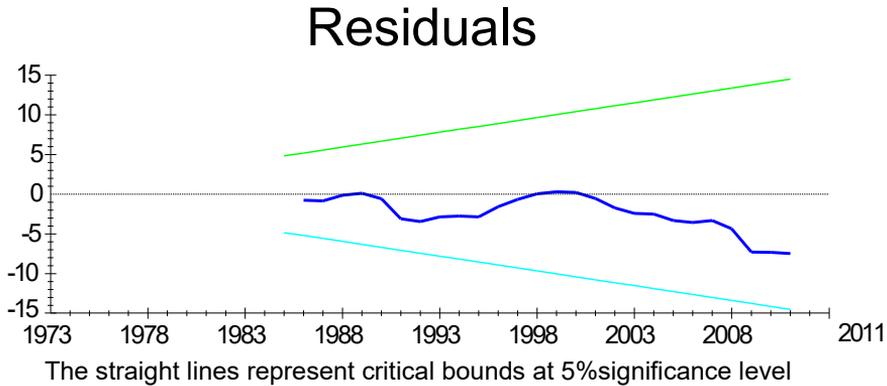
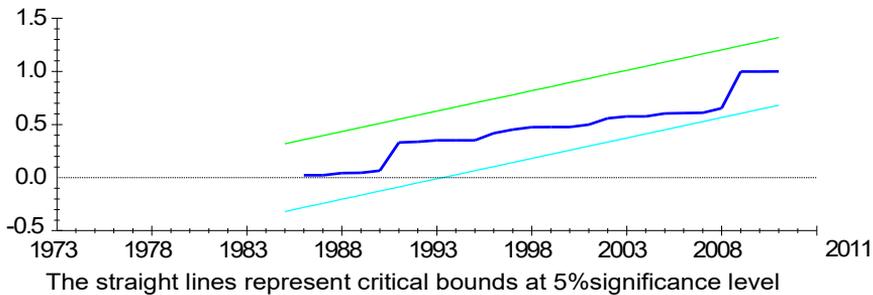


Figure 2 Cumulative sum of squares of recursive residuals

### of Recursive Residuals



### REFERENCES

- [1] Alalaya, M.M., 2010. ARDL models applied for Jordan trade, FDI and GDP series. *European Journal of Social Sciences* 13 (4) 605– 616.
- [2] Alaya, M., 2006. Investissement direct étranger et croissance économique: Une estimation à partir d'un modèle structurel pour les pays de la rive sud de la Méditerranée. 7<sup>e</sup>mes journées scientifiques du réseau "Analyse Economique et Développement de l'AUF", Paris, 7 et 8 septembre 2006.
- [3] Alfaro, L., Chanda, A., Kalemli-Ozcan, S., Sayek, S., 2004. FDI and economic growth: the role of local financial markets. *Journal of International Economics* 64, 113–134.
- [4] Arrow, K.J., 1962. Economic welfare and the allocation of resources to invention. In: Nelson, R.R. (Ed.), *The Rate and Direction of Economic Activity*. Princeton University Press, NY.

- [5] Athukorala, P.P.A.W., 2003. The impact of foreign direct investment for economic growth: a case study in Sri Lanka. In: 9<sup>th</sup> International Conference on Sri Lanka Studies, 28–30 November, Matara, Sri Lanka, In: <http://www.slageconr.net/slsnet/9thicsls/fullpapers/fullp092.pdf>.
- [6] Balassa, B., 1985. Exports, policy choices and economic growth in developing countries after the 1973 oil shock. *Journal of Development Economics* 18 (1) 23–35.
- [7] Balasubramanyam, V.N., Salisu, M.A., Sapsford, D., 1996. Foreign direct investment and growth in EP and IS countries. *Economic Journal* 106, 92–105.
- [8] Baliaoune-Lutz, M., 2004. Does FDI contribute to economic growth? *Business Economics* 39 (2) 49–56.
- [9] Bashir, A.H., 2001. Foreign Direct Investment and Economic Growth in Some MENA Countries: Theory and Evidence. Mimeo.
- [10] Bengoa, M., Sanchez-Robles, B., 2003. FDI, economic freedom and growth: new evidence from Latin America. *European Journal of Political Economy* 19, 529–545.
- [11] Blomstrom, M., Lipsey, R., Zejan, M., 1994. What explain developing country growth? NBER working paper, N84132.
- [12] Borensztein, E., Gregorio, J.D., Lee, J.W., 1998. How does foreign direct investment affect economic growth? *Journal of International Economics* 45, 115–135.
- [13] Boughzala, M., 2010. The Tunisia-European Union free trade area fourteen years, In: [http://www.iemed.org/anuari/2010/aarticles/Boughazala\\_Tunisia\\_EU\\_en.pdf](http://www.iemed.org/anuari/2010/aarticles/Boughazala_Tunisia_EU_en.pdf).
- [14] Boyd, J.H., Smith, B.D., 1992. Intermediation and the equilibrium allocation of investment capital: implications for economic development. *Journal of Monetary Economics* 30, 409–432.
- [15] Casselli, F., Esquivel, G., Lefort, F., 1996. Reopening the convergence debate: a new look at cross-country growth empirics. *Journal of Economic Growth* 1 (3) 363–389.
- [16] Dickey, D. A. and W. A. Fuller (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association* 74(366a): 427–431.
- [17] De Mello Jr., L.R., 1997. Foreign direct investment in developing countries: a selective survey. *Journal of Development Studies* 34 (1) 1–34. M. Belloumi / *Economic Systems* 38 (2014) 269–287 285
- [18] De Mello Jr., L.R., 1999. Foreign direct investment-led growth evidence from time series and panel data. *Oxford Economics Papers* 51, 133–151.
- [19] Elliot, G., Rothenberg, T.J., Stock, J.H., 1996. Efficient tests for an autoregressive unit root. *Econometrica* 64, 813–836.

- [20] Engle, R.F., Granger, C.J., 1987. Cointegration and error-correction – representation, estimation and testing. *Econometrica* 55, 251–278.
- [21] Engle, R. F., Granger, C. W., & Hallman, J. J. (1989). Merging short-and long-run forecasts: An application of seasonal cointegration to monthly electricity sales forecasting. *Journal of econometrics*, 40(1), 45-62.
- [22] Fosfuri, A., Motta, M., Rønde, T., 2001. Foreign direct investment and spillovers through workers mobility. *Journal of International Economics* 53 (1) 205–222.
- [23] Frankel, J.A., Romer, D., 1999. Does trade cause growth? *American Economic Review* 89, 379–399.
- [24] Ghali, S., Rezgui, S., 2007. FDI contribution to technical efficiency in the Tunisian manufacturing sector: a combined empirical approach. In: 14th Economic Research Forum's Annual Conference, Cairo, Egypt.
- [25] Ghirmay, T., 2004. Financial development and economic growth in Sub-Saharan African countries: evidence from time series analysis. *African Development Review* 16 (3) 415–432.
- [26] Ghirmay, T., Grabowski, R., Sharma, S., 2001. Exports, investment, efficiency and economic growth in LDCs: an empirical investigation. *Applied Economics* 33 (6) 689–700.
- [27] Glass, A., Saggi, K., 2002. Multinational firms and technology transfer. *Scandinavian Journal of Economics* 104 (4) 495–514.
- [28] Glynn, J., Perera, N., Verma, R., 2007. Unit root tests and structural breaks: a survey with applications. *Journal of Quantitative Methods for Economics and Business Administration* 3 (1) 63–79.
- [29] Grossman, G.M., Helpman, E., 1991. Endogenous innovation in the theory of growth. *Journal of Economic Perspectives* 8 (1) 23–44.
- [30] Gunther, J., 2002. FDI as a multiplier of modern technology in Hungarian industry. *Intereconomics* 37 (5) 263–269, ISSN: 0020- 5346.
- [31] Harris, R., Sollis, R., 2003. *Applied Time Series Modeling and Forecasting*. Wiley, West Sussex.
- [32] Hermes, N., Lensink, R., 2003. Foreign direct investment, financial development and economic growth. *Journal of Development Studies* 40 (1) 142–163.
- [33] Hisarciklilar, M., Kayam, S.S., Kayalica, M.O., Ozkale, N.L., 2006. Foreign direct investment and growth in Mediterranean countries. Conference concluding a Jean Monnet Project on “Sustainable development and adjustment in the MEDA countries following the EU enlargement”, Spetses Island, Greece, 3–5 July 2006, In: [http://emo.pspa.uoa.gr/data/papers/2\\_paper.pdf](http://emo.pspa.uoa.gr/data/papers/2_paper.pdf).
- [34] Johansen, S., 1988. Statistical analysis of cointegration vectors.

- Journal of Economic Dynamics and Control 12, 231–254.
- [35] Johansen, S., Juselius, K., 1990. Maximum likelihood estimation and inference on cointegration – with application to the demand for money. *Oxford Bulletin of Economics and Statistics* 52, 169–210.
- [36] Karbasi, A., Mahamadi, E., Ghofrani, S., 2005. Impact of foreign direct investment on economic growth. In: 12th Economic Research Forum's Annual Conference, Cairo, Egypt.
- [37] Kumar, N., Pradhan, J.P., 2002. Foreign direct investment, externalities and economic growth in developing countries: some empirical exploration and implication for WTO negotiations on investment. *RIS Discussion Paper No. 27*.
- [38] Li, X., Liu, X., 2005. Foreign direct investment and economic growth: an increasingly endogenous relationship. *World Development* 93, 393–407.
- [39] Lucas, R.E., 1988. On the mechanics of economic development. *Journal of Monetary Economics* 22, 3–42.
- [40] Mamun, K.A., Nath, H.K., 2004. Export-led growth in Bangladesh: a time series analysis. *Applied Economics Letters* 12 (6) 361–364.
- [41] Marc, A., 2011. Is foreign direct investment a cure for economic growth in developing countries? Structural model estimation applied to the case of the south shore Mediterranean countries. *Journal of International Business and Economics* 11 (4) .
- [42] Meschi, E., 2006. FDI and growth in MENA countries: an empirical analysis. In: The Fifth International Conference of the Middle East Economic Association, 10–12 March, Sousse.
- [43] Morley, B., 2006. Causality between economic growth and migration: an ARDL bounds testing approach. *Economics Letters* 90, 72–76.
- [44] Mintz, A., & Huang, C. (1990). Defense Expenditures, Economic Growth, and The "Peace Dividend". *The American Political Science Review*, 84(4) 1283-1293.
- [45] Mounir Belloumi. The relationship between trade, FDI and economic growth in Tunisia: An application of the autoregressive distributed lag model. *Economic Systems* 38 (2014) 269–287
- [46] Nair-Reichert, U., Weinhold, D., 2001. Causality tests for cross-country panels: a new look at FDI and economic growth in developing countries. *Oxford Bulletin of Economics and Statistics* 63, 153–171.
- [47] Narayan, P.K., Smyth, R., 2006. Higher education, real income and real investment in China: evidence from Granger causality tests. *Education Economics* 14, 107–125.
- [48] Narayan, P.K., Smyth, R., 2008. Energy consumption and real GDP in G7 countries: new evidence from panel cointegration

- zith structural breaks. *Energy Economics* 30, 2331–2341.
- [49] Nicet-Chenaf, D., Rougier, E., 2009. FDI and growth: a new look at a still puzzling issue. *Cahiers du GREThA n8 2009-13 Université de Bordeaux, GREThA UMR CNRS 5113*.
- [50] Odhiambo, N.M., 2009. Energy consumption and economic growth in Tanzania: an ARDL bounds testing approach. *Energy Policy* 37 (2) 617–622.
- [51] OECD, 2002. *Foreign Direct Investment for Development: Maximizing Benefits, Minimizing Costs*. Organization for Economic Cooperation and Development, Paris.
- [52] Pahlavani, M., Wilson, E., Worthington, A.C., 2005. Trade-GDP nexus in Iran: an application of autoregressive distributed lag (ARDL) model. *American Journal of Applied Science* 2, 1158–1165.
- [53] Pesaran, M., Pesaran, B., 1997. *Working with Microfit 4.0: Interactive Economic Analysis* Oxford University Press, Oxford.
- [54] Pesaran, M., Shin, Y., 1999. An autoregressive distributed lag modeling approach to cointegration analysis. In: Strom, S. (Ed.), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press, Cambridge.
- [55] Pesaran, M.H., Shin, Y., Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationship. *Journal of Applied Economics* 16, 289–326.
- [56] Phillips, P.C.B., Perron, P., 1988. Testing for a unit root in time series regression. *Biometrika* 75, 335–346.
- [57] Rahman, M., 2007. Contributions of exports, FDI and expatriates' remittances to real GDP of Bangladesh, India, Pakistan and Sri Lanka. *Southwestern Economic Review* 141–154.
- [58] Rahmouni, O., 2012. *Direct Investment and International Subcontracting in the Countries of the South: The Case of Tunisia*. Thesis for obtaining the doctor's title in Economics at the University Paris-Est-Cre' teil, Paris, France.
- [59] Romer, P.M., 1986. Increasing returns and long-run growth. *Journal of Political Economy* 94 (5) 1002–1037.
- [60] Romer, P.M., 1990. Endogenous technological change. *Journal of Political Economy* 98, 71–102.
- [61] Sadik, A.T., Bolbol, A., 2001. Capital flows, FDI, and technology spillovers: evidence from Arab countries. *World Development* 29 (12) 2111–2125.
- [62] Shell, K., 1966. Toward a theory of inventive activity and capital accumulation. *American Economic Review* 56 (2) 62–68.
- [63] Sengupta, J.K., Espana, J.R., 1994. Exports and economic growth in Asian NICs: an econometric analysis for Korea. *Applied Economics* 26, 41–51.

- [64] Solow, R., 1956. A contribution to the theory of economic growth. *Quarterly Journal of Economics* 70, 65–94.
- [65] Solow, R., 1957. Technical change and the aggregate production function. *Review of Economics and Statistics* 39 (3) 312–320.
- [66] Tintin, C., 2012. Does foreign direct invest spur economic growth and development? A comparative study. In: *The 14th Annual European Trade Study Group Conference*, 13–15 September, Leuven, Belgium.
- [67] United Nations Conference on Trade and Development (UNCTAD), 1999. *World Investment Report 1999: foreign direct investment and the challenge of development*. United Nations, New York and Geneva, United Nations Publication, Sales No.E.93.II.A.14.
- [68] World Bank, 2009. *World Development Indicators*, Washington, DC.
- [69] Xu, B., 2000. Multinational enterprises, technology diffusion and host country productivity growth. *Journal of Development Economics* 62, 477–493.
- [70] Yao, S., 2006. On economic growth, FDI, and exports in China. *Applied Economics* 38 (3) 339–351.
- [71] Zebregs, H., 1998. Can the neoclassical model explain the distribution of foreign direct investment across developing countries? IMF working paper, WP/98/139. . M. Belloumi / *Economic Systems* 38 (2014) 269–287