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Impact of Foreign Direct Investments on Unemployment in Emerging Market Economies: A Co-integration Analysis

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ABSTRACT

Purpose
The goal of the paper is to investigate the long run effect of both foreign direct investments and domestic investments on the unemployment in 21 emerging economies over the period 1994-2014.

Design/methodology/approach:
The effect of domestic and foreign direct investments on unemployment was investigated via panel data analysis. First tests of cross-section dependence and homogeneity were conducted, and then the stationarity of the series was analyzed with Pesaran's (2007) CIPS unit root test. The long run relationship among the series was examined with Westerlund-Durbin-Hausman's (2008) co-integration test. Finally, we estimated the long run coefficients with the Augmented Mean Group (AMG) estimator.

Findings:
The empirical findings revealed a co-integrating relationship among domestic investments, foreign direct investments, and unemployment. Furthermore, foreign direct investment inflows affected the unemployment positively in the long term, but domestic investments affected the unemployment negatively.

Originality/value:
This study can be considered as one of the early studies researching the long run interaction between domestic investments, foreign direct investments and unemployment for the sample of emerging market economies. Furthermore, the findings are very meaningful for policymakers in the design the economic policies for decreasing unemployment.

1. Introduction

Globalisation has accelerated as of mid-1980s, although its past dated back to the Second World War and has had many economic, technological, social and cultural impacts on the societies. One of the most important impacts and causes of globalisation is foreign direct investment (FDI) flows. FDI can be implemented by a new establishment termed green-field investment or by merger and acquisition of a local enterprise termed brown-field investment (Wong and Adams, 2002). Global FDI inflows reached to about $1.871 trillion in 2007, but then significant contractions have been experienced in global FDI inflows due to recent financial crises and amounted to about $1.228 trillion in 2014 as seen in Figure 1.

Emerging market economies have experienced a similar trend in FDI inflows and the share of emerging economies in international FDI inflows reached approximately 34.5% in 2014, up from 9.3% in 1990 (UNCTAD, 2016).

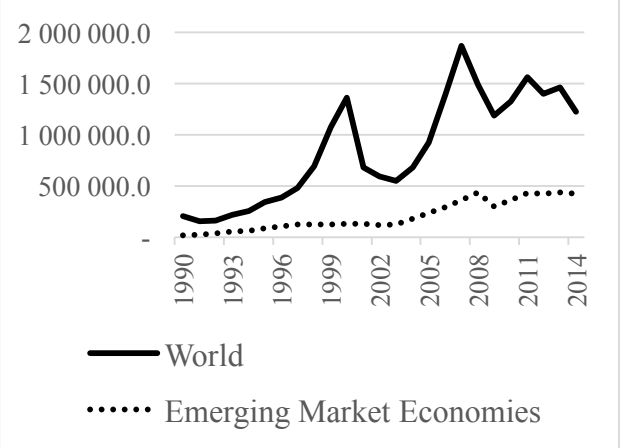

Figure 1: FDI inflows in the world and emerging market economies (millions of dollars)
Source: UNCTAD, 2016

FDI inflows place the economies of host countries at both an advantage and disadvantage; major advantages

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of FDIs are that they provide capital for productive investments and in turn, foster economic growth, create jobs, particularly FDI in the form of green-field investment, and also contribute to the economy via technology and productivity spillovers and improvements in production and competitiveness. On the other hand, FDIs harm economies by deteriorations in financial stability and inequality and environmental degradation.

The goal of this study was to analyze the interaction among unemployment, domestic investments, and foreign direct investments in 21 emerging economies between the 1994 to 2014 period via a Westerlund-Durbin-Hausman (2008) co-integration test. In this context, we first review the literature, then give information about data and method. We then present the major results of the empirical application in section 4 and finally conclude the study in section 5.

2. Review of the Literature

The considerable increase in global FDI flows have directed scholars to analyze the effect of FDI flows on various macroeconomic and microeconomic indicators such as economic activity, unemployment, tax revenues, environmental degradation, and competitiveness. However, a great majority of the studies have focused on the interplay between FDI flows-economic growth; these studies mostly revealed that FDI inflows have had a positive influence on growth (See Yao (2006), Yucel (2014), Bhattarai (2016)). However, relatively few studies have been carried out to determine the impact of FDI inflows on unemployment and those that did, have reached different mixed findings. A large number of studies revealed that FDI inflows affected unemployment negatively (see Seyf (2000), Craigwell (2006), Karlsson et al. (2009), Balcerzak and Zurek (2011), Carp (2012), Shaari et al. (2012), Mehra (2013), Gocer et al. (2013), Zeb et al. (2014) and Kurtovic et al. (2015)), while relatively fewer studies have discovered a positive relationship through FDI inflows and unemployment (see Mucuk et al. (2013), Bayar (2014)). Furthermore, a considerable number of studies also found no significant relationship between FDI inflows and unemployment (see Chang (2007), Rizvi and Nishat (2009), Aktar et al. (2009), Peker ve Gocer (2010) and Djambaska and Lozanoska (2015)).

Table 1: Literature summary

Study	Country/Country Group and Period	Method	Impact of FDI on unemployment
Seyf (2000)	France, Germany, Spain, UK, 1994	Regression	Negative
Craigwell (2006)	20 Caribbean countries, 1990-2000	Panel data analysis	Negative
Chang (2007)	Taiwan, 1981-2003	VAR analysis	No causality
Rizvi and Nishat (2009)	Pakistan, India and China, 1985-2008	Panel data analysis	No significant impact
Karlsson et al. (2009)	China, 1998-2004	Time series analysis	Negative
Aktar et al. (2009)	Turkey, 2001-2007	VAR analysis	No significant impact
Peker ve Gocer (2010)	Turkey, 2000-2009	ARDL cointegration	No significant impact in the long run
Pinn et al. (2011)	Malaysia, 1970-2007	ARDL cointegration and causality tests	One-way causality from FDI to employment
Balcerzak and Zurek (2011)	Poland, 1995-2009	VAR analysis	Negative
Carp (2012)	Romania, 1991-2010	Regression	Negative
Shaari et al. (2012)	Malaysia, 1980-2010	Regression	Negative
Yayli ve Deger (2012)	27 developing countries, 1991-2008	Causality analysis	One-way causality from FDI to employment
Mucuk et al. (2013)	7 countries, 1981-2009	Panel data analysis	Positive (Turkey and Argentina), while negative (Thailand)
Mehra (2013)	India, 1970-2007	Regression	Negative
Gocer et al. (2013)	Turkey, 2000-2011	ARDL cointegration	Negative
Zeb et al. (2014)	Pakistan, 1995-2011	Regression	Negative
Bayar (2014)	Turkey, 2000-2013	ARDL cointegration	Positive
Kurtovic et al. (2015)	6 Western Balkan countries, 1998-2012	Pedroni and Fisher-Johansson cointegration tests and Granger causality test	Negative
Djambaska and Lozanoska (2015)	Macedonia 1999-2013	Regression	No significant impact

Study	Country/Country Group and Period	Method	Impact of FDI on unemployment
Strat et al. (2015)	last 13 EU member countries, 1991-2012	Toda and Yamamoto (1995) causality test	Unidirectional causality from FDI inflows to unemployment for 4 countries, opposite one-way causality for 3 countries and no causality for 6 countries

3. Data and Econometric Methodology

3.1. Data

The annual values of FDI inflows, gross capital formation, and unemployment were extracted from World Bank (2016a, 2016b and 2016c) data to investigate the relationship among FDI net inflows, unemployment and gross capital formation, as seen in Table 2. The study sample was established taking notice of the MSCI (2016) emerging markets index, but the existence of data limited the sample and study period. The sample included 21 emerging economies (Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Russia, South Africa, Thailand and Turkey) and the period of study was 1994 to 2014.

Table 2: Data description

Variables	Description	Source
unemp	Unemployment, total (% of total labor force)	World Bank (2016a)
fdi	Foreign Direct Investment, Net Inflows (% of GDP)	World Bank (2016b)
gcf	Gross capital formation (percent of GDP)	World Bank (2016c)

3.2. Econometric Methodology

First the cross-sectional dependence was investigated with LM adjusted test of Pesaran et al. (2008) considering the equality of time dimension and cross-section dimension (N=T=21) of the dataset. Secondly, homogeneity of the co-integrating coefficients was analyzed with the adjusted delta tilde test established by Pesaran and Yamagata (2008). Thirdly, the stationarity of the series was examined with Pesaran's (2007) CIPS unit root test, taking notice of cross-sectional dependence. Fourthly, the co-integrating relationship was analyzed using the Westerlund-Durbin-Hausman (2008) co-integration test. Finally, we estimated the long run coefficients with Augmented Mean Group (AMG) estimator (see Eberhardt and Bond (2009), Eberhardt and Teal (2010, 2011)).

3.2.1. Cross-sectional Dependency and Homogeneity Test

Cross-sectional dependence indicates that a shock in a cross-sectional unit affects the other cross-sectional units. Therefore, cross-sectional dependence should be considered in the selection of the econometric tests used in the study. The first test, the LM (cross-section dependence LaGrange multiplier) test, investigating cross-sectional dependence was developed by Breusch and Pagan (1980), then Pesaran (2004) developed the LM CD (cross-section dependence) test. However, these two tests may yield biased results when group average equals zero, but individual average is different from zero. Thereupon Pesaran et al. (2008) corrected the biasness by adding the variance and mean to the test statistics. Therefore, Pesaran et al. (2008) cross-sectional dependence test called as $LM_{adj.}$(adjusted LM test) and the test statistic of adjusted LM is calculated as follows (Pesaran et al., 2008):

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\frac{(T-k)\hat{\rho}_{ij}^2 - \mu_{Tij}}{v_{Tij}}} \quad (1)$$

The null hypothesis indicates that there is a cross-sectional independence among the series, while alternative hypothesis shows that there is cross-sectional dependency. On the other hand, the homogeneity test investigates whether the slope coefficients are homogenous or not (Pesaran and Yamagata, 2008). The homogeneity of the slope coefficients is also important for the selection of unit root, co-integration, and causality tests. The test statistics of delta and adjusted delta tests of Pesaran and Yamagata (2008) are calculated as follows:

$$\tilde{\Delta} = \sqrt{N}\left((N\text{^}(-1)S^{-} - k)/2k\right) \sim X\_k\text{^}2 \quad (2)$$

$$\tilde{\Delta}\_\text{adj} = \sqrt{N}\left((N\text{^}(-1)S^{-} - k)/\text{v}(T,k)\right) \sim N(0,1) \quad (3)$$

In the equations numbered (2) and (3), N represents the cross-section dimension, S indicates Swamy test statistic, k shows the number of independent variables, and v(T,k) represents the standard error. Finally, the null hypothesis indicates that the slope coefficients are homogenous, while alternative hypothesis indicates that the slope coefficients are heterogeneous.

3.2.2. CIPS Panel Unit Root Test

Pesaran's (2007) Cross-Sectionally Augmented Dickey Fuller (CADF) test uses the panel regression model in equation (3) and the stationarity of the variables is investigated using the t statistics of the $\hat{\alpha}_{1i}$. Furthermore, Pesaran (2007) calls the Cross-Sectionally Augmented IPS (CIPS) (Im-Pesaran-Shin (2003)) as arithmetic mean of the CADF test statistics, as seen in equation (5).

$$\Delta y_{it} = \alpha_{0i} + \alpha_{1i} y_{i,t-1} + \alpha_{2i}\bar{y}_{t-1} + \alpha_{3i}\Delta\bar{y}_{t-1} + \varepsilon_{it} \quad (4)$$

$$CIPS = \frac{\sum_{i=1}^{N} CADF_i}{N} \quad (5)$$

The null hypothesis of the test indicates that every cross-section of the panel is not stationary. CIPS test has an asymptotically standard distribution and the critical values of the test were tabulated by Pesaran (2006) with use of Monte Carlo Simulation.

3.2.3. Westerlund-Durbin-Hausman (2008) Cointegration Test

The Westerlund-Durbin-Hausman (2008) co-integration test considers both cross-sectional dependency and heterogeneity and can be used where the independent variables are different integration levels, on condition that the dependent variable is I(1). The test calculates two different test statistics called as Durbin-Hausman group (DH_g) and Durbin-Hausman panel (DH_p). The DH_g statistic is considered when the panel is heterogeneous, while DH_p test statistic is considered when the panel is homogeneous (Westerlund, 2008)

$$DH_g = \sum_{i=1}^{n} \bar{S}_i \left(\widetilde{\emptyset}_\iota - \bar{\emptyset}_\iota\right)^2 \sum_{t=2}^{T} \bar{e}_{it-1} \qquad (6)$$

$$DH_p = \bar{S}_n = \left(\widetilde{\emptyset}_\iota - \bar{\emptyset}_\iota\right)^2 \sum_{i=1}^{n} \sum_{t=2}^{T} \bar{e}_{it-1} \quad (7)$$

The refusal of the null hypothesis revealed the existence of the co-integrating relationship among the variables.

4. Empirical Analysis

4.1. Cross-sectional Dependency and Homogeneity Test

The Pesaran et al. (2008) LM adjusted test was used where the time dimension and cross-sectional dimension both are 21; the test results are presented in Table 3. We rejected the null hypothesis (there is cross-sectional independence) at 5% significance level, because probability values were found to be smaller than 5%. So we discovered a cross-section between the series. Furthermore, the homogeneity of the co-integrating coefficients was investigated by adjusted delta tilde test of Pesaran and Yamagata (2008) and null hypothesis (there is homogeneity) was denied as a result of test results. We therefore concluded that the cointegrating coefficients were heterogenous.

Table 3: Results of cross-sectional dependency and homogeneity tests

Cross-sectional dependency tests		
Test	**Statistic**	**p-value**
LM (Breusch and Pagan (1980))	469.7	0.0000
LM adj* (Pesaran et al. (2008))	28.95	0.0000
LM CD* (Pesaran (2004))	2.757	0.0058
Homogeneity tests		
Test	**Statistic**	**p-value**
Delta_tilde	11.461	0.000
Delta_tilde_adj	12.899	0.000

*two-sided test

4.2. CIPS Panel Unit Root Test

The integration levels of the series was analyzed with Pesaran's (2007) CIPS (Im- Pesaran-Shin (2003) unit root test due to the cross-sectional dependence between the variables. The test results can be found in Table 4 and the unemp and gcf were found to be I(1), while fdi was found to be I(0) considering the test results.

Table 4: CIPS panel unit root test results

Variables	**Constant**	**Constant + Trend**
unemp	-0.043(0.483)	-1.158 (0.124)
d(unemp)	-7.522 (0.000)***	-5.897 (0.000)***
fdi	-3.196 (0.001)***	-1.569 (0.058)*
d(fdi)	-10.384 (0.000)***	-8.076 (0.000)***
gcf	0.628 (0.735)	-0.316 (0.376)
d(gcf)	-6.934 (0.000)***	-4.262 (0.000)***

* significance at 1% level

4.3. Westerlund-Durbin-Hausman (2008) Co-integration Test

The Westerlund-Durbin-Hausman (2008) co-integration test was employed to analyse the long run relationship among unemployment, FDI inflows and gross capital formation, because dependent variable *unemp* was I(1) and the remaining variables had different integration levels; the findings of the test are shown in Table 5. The group statistic was taken in consideration due to heterogeneity of the cointegrating coefficients. Therefore, the null hypothesis was denied and we revealed a cointegration for some cross-section units.

Table 5: Results of Westerlund-Durbin-Hausman (2008) cointegration test

	Statistic	**p-value**
Durbin-Hausman Group Statistic	9.087	0.000
Durbin-Hausman Panel Statistic	5.019	0.000

4.4. Estimation of Co-integrating Coefficients

The long run coefficients was estimated by AMG estimator taking notice of cross-sectional dependence and the heterogeneity. These results , displayed in table 6 show that FDI inflows (FDI) affected the unemployment positively in the overall panel, while gross capital formation (GCF) affected the unemployment negatively in the overall panel. However, individual long run coefficients denoted that FDI inflows affected the unemployment negatively in Colombia, Mexico and Russia, while FDI inflows affected the unemployment positively in Brazil, China, Czech Republic, India, Korea, Poland, Thailand and Turkey. Furthermore, FDI inflows had no significant effects on the unemployment in Chile, Egypt, Greece, Hungary, Indonesia, Malaysia, Peru, Qatar, and South Africa.

On the other hand, gross capital formation (GCF) affected the unemployment negatively in Brazil, Chile, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Mexico, Peru, Poland, Russia and Turkey, but gross capital formation (GCF) had no significant effects over the unemployment in China, Malaysia, Philippines, Qatar, South Africa and Thailand.

Table 6: The cointegrating coefficients

Country	FDI		GCF	
	Coefficient	P value	Coefficient	P value
Brazil	0.2813926	0.065*	-0.380289	0.000***
Chile	-0.0275237	0.785	-0.2585017	0.003***
China	0.1988082	0.097*	0.0116024	0.647
Colombia	-0.4717443	0.001***	-0.3266206	0.000***
Czech Republic	0.2807283	0.000***	-0.2230807	0.001***
Egypt	0.1151952	0.272	-0.5046835	0.000***
Greece	1.156838	0.410	-1.035121	0.000***
Hungary	0.0023687	0.922	-0.5585909	0.000***
India	0.3998078	0.028**	-0.0569857	0.028**
Indonesia	0.4780541	0.218	-0.1668575	0.099*
Korea	0.8875871	0.011**	-0.2270043	0.000***
Malaysia	0.0272136	0.777	0.0012122	0.947
Mexico	-1.075137	0.016**	-0.3534863	0.020**
Peru	0.173671	0.198	-0.1420864	0.012**
Philippines	-0.0023873	0.995	0.2051428	0.112
Poland	1.132812	0.059*	-1.028136	0.005***
Qatar	0.0167804	0.691	0.0202223	0.136
Russia	-0.7895164	0.020**	-0.3345997	0.016**
South Africa	0.2310312	0.510	-0.3275028	0.217
Thailand	0.235786	0.068**	0.0073256	0.790
Turkey	0.9418496	0.004***	-0.2818455	0.018**
Panel	**0.199696**	**0.000*****	**-0.2838041**	**0.000*****

5.Conclusion

The significant increases in both-green field and brown-field FDI flows have been experienced globally, and changes in FDI flows have affected many economic indicators such as growth rate of economic activity, unemployment, tax revenues, environmental degradation, and competitiveness. In this study, we researched the long run interaction among domestic investment, foreign direct investments, and the unemployment in emerging markets during 1994-2014 period with Westerlund-Durbin-Hausman (2008) co-integration test. The results indicate that FDI inflows positively affects unemployment in overall panel, as in Mucuk et al. (2013) and Bayar (2014), while gross capital formation negatively affected the unemployment in the overall panel. However, FDI inflows affected the unemployment negatively in Colombia, Mexico and Russia, while FDI inflows affected the unemployment positively in Brazil, China, Czech Republic, India, Korea, Poland, Thailand and Turkey. Furthermore, FDI inflows had no significant effects on unemployment in Chile, Egypt, Greece, Hungary, Indonesia, Malaysia, Peru, Qatar and South Africa.

The large part of the empirical literature on the FDI-unemployment nexus showed that FDI inflows have negatively impacted unemployment. Therefore, our findings were found to be inconsistent with the general trend in the relevant literature. However, we evaluated that the positive impact of FDI inflows on the unemployment may be a result of the relatively higher share of brown-field investments consisting of mergers and acquisitions in FDI inflows in our sample. Future studies can be conducted to investigate the separate impact of both brown-field investments and green-field investments on the unemployment.

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