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RELATIONSHIP BETWEEN OUTWARD FOREIGN DIRECT INVESTMENT AND DOMESTIC INVESTMENT: EVIDENCE FROM GCC COUNTRIES

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ABSTRACT

This paper examines the relationship between outward foreign direct investment and domestic investment, which is regarded with increased interest as a driver of growth in domestic markets for Gulf Cooperation Council (GCC) economies. Mean group (MG), pooled mean group (PMG) and dynamic fixed effect (DFE) approaches have been applied to measure short-run and long-run effects of domestic investment (DI) on outward foreign direct investment (OFDI) by relaxing the assumption of cross-sectional dependence (CD). This research shows that ignoring cross-sectional dependency among the countries which are parallel in economic structure may result in biased economic estimations. The findings of the dynamic fixed effect estimators show that domestic investment has negative and significant effects on FDI outflows in the long run in GCC countries. Furthermore, some of macroeconomic variables (trade and inflation) have insignificant effects on OFDI, whereas human capital has positive and significant effects on FDI outflows in the long run. The findings of this research remain important for policy makers to determine the practical efficacy of market reforms steered towards boosting domestic investment and growth. Furthermore, the policies related to the development of human capital can also take guidance from this study.

Contribution/Originality: Herzer & Schrooten (2008) and Desai, Foley, & Hines (2005) have neglected the cross-sectional dependency issue in cross-country studies. Therefore, we applied the cross-sectionally augmented autoregressive distributed lag (CS-ARDL) approach to control cross-sectional dependency issues to get unbiased estimations.

1. INTRODUCTION

The Gulf Cooperation Council (GCC), which is a political and economic alliance of six Middle Eastern countries—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates—has been studied adequately for the impact of FDI on domestic investment and economic growth (Al-Iriani, 2007; Ghassan & Alhajhoj, 2016; Hansen & Rand, 2006; Lim, 2001). However, the theoretical and empirical studies on investigating

the inter-relationship between outward foreign direct investment and domestic investment remain limited. Investing abroad is seen to impact domestic economies in many ways. The impact may vary from one country to another depending on the characteristics of the home country and on the firms' underlying motives for investing abroad. Stevens & Lipsey (1992) argued that the impact that OFDI can have on DI is seen to occur through two channels; the first channel being domestic financial markets whereby the firms seeking to invest abroad transfer some of the capital abroad shifting a part of the domestic private capital out of the home country. The domestic firms are likely to face drawbacks in raising capital in domestic financial markets, therefore reducing the financial liquidity and new investment activities in the domestic market. The second channel is via product markets and the effects on domestic investment by shifting production abroad. Dunning (1993) identified three motives for firms seeking to invest abroad: efficiency-seeking, market-seeking and strategic asset-seeking.

The GCC, which is known to be a fertile ground for foreign direct investment, saw an exponential surge in FDI from 2002 to 2010, which outpaced the rest of the world by significant margins (World Bank, 2017). A 3800% increase in FDI levels in the GCC between 2002 to 2008 was followed by a persistent fall. FDI inflows to the GCC have seen a decreasing trend since 2010 (EU, 2018). On the contrary, outward foreign direct investment levels have increased from the GCC region. OFDI figures remain significantly higher than FDI numbers, predominantly in the Kingdom of Saudi Arabia, the United Arab Emirates and Qatar.

Table 1. Outward and inward FDI flows for GCC countries measured in USD at current prices.
(Millions of dollars)

	Avg. 2005-2007	2014	2015	2016	2017	2018
GCC Net OFDI	20,574	14,376	34,999	33,806	34,701	44,250
GCC Net FDI	38,371	23,833	15,967	20,174	17,451	17,433

Note: Units for outward foreign direct investment flows are in millions of US dollars.
Source: UNCTAD, 2019.

The rising level of outward FDI (see Table 1) from the GCC have raised concerns regarding the impact on their domestic investment given the drastic fall in the inward FDI coupled with the relatively low proportions at the same time. Little attention has been paid by international literature to this aspect. Policymakers in these countries have made substantial progress in improving the international trade climate of the region, however, further assessments need to be made to understand how domestic investment is affected by FDI outflows in this region (World Bank, 2019). Domestic investment is a prime determinant of the rate of physical capital accumulation, which, in turn, determines the rate of economic growth. Understanding the impact of FDI outflows on domestic investment could be an important stride in introducing market reforms boosting domestic investment and thereby enhancing growth.

The cross-sectional dependency in foreign direct investment series due to homogenous economic structure and similar government policies in GCC countries could be a possible issue. Neglecting the cross-sectional dependency problem in cross-country studies may result in biased and spurious estimations (Costantini & Destefanis, 2009; Lee, Pesaran, & Smith, 1997; Pedroni, 2007; Pesaran & Smith, 1995; Phillips & Sul, 2003). Therefore, by utilizing the most recent developments in econometric approaches we used the cross-sectionally augmented autoregressive distributed lag (CD-ARDL), which remains a novel contribution of this study as many of the previous studies, such as Herzer & Schrooten (2008) and Desai et al. (2005), have neglected the cross sectional dependency issue in cross country studies. These studies also have failed to take into consideration other macroeconomic variables, such as GDP, trade openness and GDP per capita, which are likely to influence the relationship between OFDI and DI due to their roles as intermediate variables. This methodological gap has been bridged in this study by including the key macroeconomic variables in the model that has enhanced the determination of a relationship between OFDI and DI in these countries.

The rest of the paper is organized as follows: Section 2 presents the literature review, Section 3 explains the data sources and econometric methodologies, Section 4 presents the results and findings of the analysis, and the final section concludes the paper.

2. LITERATURE REVIEW

The theoretical literature generally confirms four motives that firms may have in investing abroad: efficiency-seeking, resource-seeking, market-seeking and strategic asset-seeking (Dunning, 1993). Vertical OFDI is seen to improve trade in economies that succeed to relocate the components of the production chain from the home to the host countries without hurting domestic production (Braunerhjelm, Oxelheim, & Thulin, 2005). In such cases, OFDI increases the productivity of local firms and also improves the export of intermediate goods to their foreign counterparts, thereby stimulating domestic investment (Hejazi, 2005). On the contrary, OFDI can have a negative impact on domestic investment if the production facilities are moved from the home to the host countries or the exports are displaced. The possibility of the diversion of domestic investment has also been reported in recent literature, which may have arisen due to the substitution of domestic production with that of overseas, as usually seen in horizontal OFDI (Desai, Foley, & Hines Jr, 2005). A strategic asset-seeking motive argues that OFDI improves domestic investment in home countries by introducing new knowledge and technologies in high spillover sectors (Kamal, Shah, Jing, & Hafsa, 2019; You & Solomon, 2015).

The empirical findings in this paradigm are discussed mainly in two strands: the studies conducted on firm–level data (Feldstein, 1995; Stevens & Lipsey, 1992) and the works that focused on aggregate macro-level data (Andersen & Hainaut, 1998; Feldstein, 1995; Herzer & Schrooten, 2008). A positive long-run unidirectional causal relationship is seen to run from OFDI to domestic investment in China, but there is no evidence of a short-run causal impact (Ameer, Xu, & Alotaish, 2017). Studies, such as that by Huang & Yang (2020), confirm the positive spillover effect of OFDI beyond country level to the inter-regional spheres. In contrast, studies, such as those by Desai et al. (2005) and Feldstein (1995), that conducted a cross-country analysis on macroeconomic indicators concluded a negative relationship, meaning that an increase in OFDI leads to a decrease in domestic investment. Similar results were found for the United states, Germany, Japan and the United Kingdom (Andersen & Hainaut, 1998). However, a positive long-run effect of OFDI on domestic investment was found in a similar study conducted on the United States, while for Germany the results have been mixed (Herzer & Schrooten, 2007). This study concludes that outward FDI imparts positive short-run and negative long-run effects on domestic investment. Therefore, in the short run, OFDI complements domestic investment, but disrupts the same in the long-run in the case of Germany. The earliest studies on firm level data conducted by Stevens & Lipsey (1992) showed a strong positive correlation between FDI outflows and domestic investment.

It is worth noting that the extant literature on OFDI comprises the studies examining the relationship of OFDI with various macroeconomic variables, such as growth, exports and productivity (Damijan, Polanec, & Prašnikar, 2007; Tolentino, 2010). Damijan et al. (2007) studied a set of manufacturing firms from Slovenia to investigate the relationship between outward FDI and total factor productivity. Globerman (2012), while studying the impact of outward foreign direct investment on home country capital investment, found that these variables are complements in the longer run. Of the very few studies of this nature conducted on the GCC, the majority were conducted on inward FDI (Al-Harthi, 2018; Hussein, 2009; Mina, 2007; Mina, 2009; Zahir, 2008). The GCC economies are characterized by being highly oil-based, with synchronization of the member countries' business cycles. Hydrocarbon makes up the largest portion of government revenue and stands as the main driver of growth. Being highly hydrocarbon-based, these economies remain subject to similar shocks originating from oil market developments. More recently, the GCC alliance has paid considerable attention to sustained economic growth away from oil. With regard to this, private investment rates via OFDI have witnessed a remarkable increase (Khalifah, 2012). The internationalization of the GCC firms is a relatively recent phenomenon and has attracted very little

attention from scholars. The research investigating OFDI effects on the GCC region are not just scarce but non-existent. Therefore, the present research will be a landmark study expected to fill the void in the international literature.

Regarding the methodological strides made in the area of studying OFDI, it is recommended to apply CS-ARDL approach for analyzing long-term heterogeneous data when common correlation effects are present in panel dynamic ordinary least squares (DOLS) (Mark & Sul, 2003), panel fully modified ordinary least squares (FMOLS) (Pedroni, 2001) and panel pooled and mean group methods (Beck & Katz, 1995; Pesaran, Shin, & Smith, 1999). These models are known to address the issue of cross-country dependence in addition to correcting the issues of heteroscedasticity and serial correlation in the panel data. Al-Sadiq (2013) examined the effects of OFDI on domestic investment in developing countries using the system generalized method of moments (GMM) estimator to control for the possible simultaneous determinants of the nine dependent variables and some of the independent variables. Contrary to the results achieved by You & Solomon (2015), it was found that FDI outflows have a positive impact on DI by using the GMM on industrial-level data. Ameer et al. (2017) used cointegration and Granger causality analyses, including bivariate and multivariate Granger causality models, to examine the relationship between OFDI and domestic investment in China.

This study used the system GMM estimator to control for the possible simultaneous determinants of the nine dependent variables and some of the independent variables and found that the FDI outflows negatively impact the rate of domestic investment. On the contrary, You & Solomon (2015) found that FDI outflows have a positive impact on direct investment by using the GMM on industrial-level data. Many of the previous studies have measured short-run and long-run effects of OFDI on DI. To the best of our knowledge, no previous studies have measured the impact of direct investment on outward foreign direct investment in the short-run and long-run, keeping cross sectional dependency at bay.

3. DATA AND METHODOLOGY

This study considered OFDI (% GDP) as a dependent variable. Domestic investment (DI) as percentage of GDP is the primary endogenous and key variable in our model. Other control variables include trade (% GDP), inflation (% annual) and human capital (total, % of relevant age group). This study used data sets from different sources, including the World Bank and the United Nations Conference on Trade and Development (UNCTAD). Data sets for outward foreign direct investment were downloaded from UNCTAD. We used gross capital formation (GCF) as a proxy for domestic investment and the level of lower secondary completion rate (total, % of relevant age group) as a proxy for human capital. Data for endogenous and control variables, such as DI (% GDP), inflation measured in terms of GDP deflator (annual %) and level of lower secondary completion rates (total, % of relevant age group) were used as proxies for human capital and were downloaded from World Development Indicators on the World Bank website. The data set, which ranges from 1993 to 2017 annually, was determined by the time span for which data was available for all the economies of the Gulf Cooperation Council.

3.1. Cross-sectional Dependence and Unit Root Test.

This research primarily applied a cross-sectional dependence test introduced by Pesaran (2004) to investigate contemporaneous correlation across countries among GCC countries by applying second generation panel unit root tests and cross-sectional dependency augmented ARDL panel approaches to remove cross-sectional dependency bias among the panel group of GCC countries. The presence of cross-sectional dependence is the pre-requisite for the application of the CD-ARDL panel methodology. The null hypothesis of the Pesaran (2004) CD test is of cross-sectional independence against the alternative hypothesis of cross-sectional dependence among the respective countries. The test follows the below equation:

$$CD = \left(\frac{TN(N-1)}{2}\right)^{1/2} \bar{\bar{\rho}} \qquad (1)$$

where $\bar{\bar{\rho}} = \left(\frac{2}{N(N-1)}\right) \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}$ and $\hat{\rho}_{ij}$ indicate the pair-wise, cross-sectional correlation coefficient of the residuals obtained from the augmented Dickey–Fuller (ADF) regression. *N* and *T* indicate the cross-section and time dimensions, respectively.

3.2. Panel Cointegration Approaches

First of all, the cross-sectional dependency (CD) and CIPS panel unit root tests were applied to examine whether these models can solve the problem of CD and non-stationary residual. Based on the outcome of the CD test, additional panel cointegration approaches were applied since the level of OFDI by one country is expected to have an impact on the level of foreign direct investment outflows of another country. Thus, the presence of CD is a possibility in GCC economies. Chudik and Pesaran (2015) recently developed a cross-sectional augmented ARDL approach to control cross-sectional dependence error processes as cross-correlation occurs very frequently due to spatial spillover effects, omitted common factors and interactions within socioeconomic networks. Thus, we have applied the CD-ARDL method by using the mean group (MG) estimator developed by Pesaran and Smith (1995) and the pooled mean group (PMG) and dynamic fixed effect (DFE), which were developed by Pesaran et al. (1999), to control cross-sectional dependency by taking cross-sectional mean averages of independent and lagged dependent variables over a period of time in our sample countries. Furthermore, we have applied MG, PMG and DFE approaches to measure short-run and long-run effects of direct investment on OFDI by relaxing the assumption of cross-sectional dependency and by accounting for the heterogeneity. Additionally, the dynamic ordinary least squares (DOLS) and feasible modified ordinary least squares (FMOLS) approaches were applied as robust checks of our estimations. We used the above estimators to estimate the following panel regression shown by Equation 2:

$$OFDI_{it} = \alpha_i + d_i t + \beta_{i1} DI_{it} + \beta_{i2} Trade_{it} + \beta_{i3}\ Inflation\ _{it} + \beta_{i4}\ Human\ Capital\ _{it} + \varepsilon_{it} \qquad (2)$$

Where, *i* stands for cross-sectional dimension $i = 1\ldots\ldots.i$ and time period $t = 1\ldots\ldots t$ and α_i represents country-specific effects and *dt* denotes heterogeneous country-specific deterministic trends. Note that $\boldsymbol{\alpha_i}$ is related to the coefficient of respective independent variables, such as $\boldsymbol{\beta_{i1} = \alpha_{i1}/1\text{-}\alpha_{i1}}$, $\boldsymbol{\beta_{i2} = \alpha_{i2}/1\text{-}\alpha_{i1}}$, $\boldsymbol{\beta_{i3} = \alpha_{i3}/1\text{-}\alpha_{i1}}$ and $\boldsymbol{\beta_{i4} = \alpha_{i4}/1\text{-}\alpha_{i1}}$.

4. RESULT AND DISCUSSIONS

4.1. Descriptive Statistics and Panel Unit Root Testing

Initially, this study used descriptive statistics to have a clear and generalized view of the data set; the results are reported in Table 2.

Table 2. Sample descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
OFDI	150	1.45	3.17	-10.35	9.55
DI	150	21.21	5.11	10.48	34.52
Trade	150	103.67	30.65	56.08	191.87
Inflation	150	3.924	10.96	-25.95	33.75
Human Capital	150	86.98	13.43	54.85	122.53

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For the entire panel, the average OFDI as a percentage of GDP is 1.459%, while the average level of DI as a percentage of GDP is 21.211%. Moreover, the average level of trade (% GDP) is 103.672%, while the average level of inflation rate, GDP deflator (annual %) is 3.924%. Furthermore, the average level of lower secondary completion rate (total, % of relevant age group) is 86.987%. The result of the CD test (see Table 3) clearly shows that each series in the panel exhibits cross-sectional dependence. Therefore, Pesaran's (2007) cross-sectionally augmented panel unit root (CIPS) (Z(t-bar)) test for unit roots was applied allowing for cross-sectional dependence.

Table 3. Second generation panel unit root.

Variable	$\hat{\rho}$	CD	Levels CIPS	First Differences CIPS
OFDI	0.319	4.26***	-0.904	-6.803***
DI	0.535	9.83***	-0.232	-2.406***
Trade	0.503	9.75***	0.179	-4.866***
Inflation	0.853	16.52***	-3.694***	-8.035***
Human Capital	0.302	3.43***	-0.231	-3.156***

4.2. Panel CD Augmented ARDL (PMG, MG, DFE)

After calculating for cross-sectional dependency statistics, we estimated the regression by applying the cross-sectional augmented Dickey–Fuller (CADF) panel unit root test as given below in Equation 3:

$$\Delta y_{it} = \alpha_i + \kappa t_i + \beta_i y_{it-1} + \gamma_i \bar{y}_{t-1} + \phi_i \Delta \bar{y}_t + \varepsilon_{it} \quad (3)$$

Here, $t = 1, \dots, T$, $i = 1, \dots, N$ and $\bar{y}_t$ indicate the cross-sectional mean of y_{it}, which is derived from $\bar{y}_t = N^{-1} \sum_{i=1}^{N} y_{it}$. The CIPS test suggests that each series contains a unit root at level except inflation. All variables are stationary at first difference. The variables are integrated of mixed order in our model and, therefore, it will be more feasible to apply the panel CD-ARDL approach to remove cross-sectional dependency biasedness in our data set and econometric model. The consideration of the cross-sectional mean mitigates the contemporaneous correlation among y_{it}. The null hypothesis of Equation 4 is $H_0: \beta_i = 0$ for all i and the alternative hypothesis is $H_a: \beta_i < 0$ for some i. Pesaran (2007) provides the cross-sectionally augmented panel unit root (CIPS) test statistic as follows in Equation 4:

$$CIPS(N, T) = N^{-1} \sum_{i=1}^{N} t_i(N, T) \quad (4)$$

where $t_i(N, T)$ indicates the t-statistic of β_i.

The cross-sectionally augmented panel unit root (CIPS) test results, reported in Table 3, show that variables are integrated of mixed order. Therefore, we applied the cross-sectional augmented autoregressive distributed lag (CD-ARDL) approach as given below in Equation 5:

$$\Delta Y_{it} = \mu_i + \varphi_i(Y_{it-1} - \beta_i X_{it-1} - \phi_{1i} \bar{Y}_{t-1} - \phi_{2i} \bar{X}_{t-1}) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta Y_{it-j} + \sum_{j=0}^{q-1} \zeta_{ij} \Delta X_{it-j} + \eta_{1i} \Delta \bar{Y}_t + \eta_{2i} \Delta \bar{X}_t + \varepsilon_{it} \quad (5)$$

$\varUpsilon_{it}$ is the dependent variable (OFDI), μ_i is the intercept, β_{it} is the slope coefficient of independent variables and lagged dependent variables, X_{it} (DI, trade, inflation and human capital) is the vector of independent variables, φ_i is the error correction term. $\bar{Y}_{t-1}$ and $\bar{X}_{t-1}$ provide a proxy for the unobserved factors in the long run, while $\Delta\bar{Y}_t$ and $\Delta\bar{X}_t$ provide a proxy for the unobserved factors in the short run.

4.3. Effects of Domestic Investment on Outward Foreign Direct Investment in Short Run and Long Run (Existence of Cross-sectional Dependency)

Table 4 presents the result of the pooled mean group (PMG), mean group (MG) and dynamic fixed effect (DFE) estimators. We focused on the DFE estimator to explain our main result findings, since its superiority over PMG and MG is confirmed by the Hausman specification test. Results show that the coefficient of error correction term is negative and significant. Our estimations show that inflation has positive and significant effects on FDI outflows in the short run; generally, inflation has negative effects on the economy in the long run. Our estimations are economically justifiable as governments tend to resort to monetary easing in the short run to stabilise the economy, which, in turn, may cause inflation but improve FDI inflows by providing incentives to foreign investors to invest in the local economy. Thus, there may be economic circumstances where inflation may have positive effects in the economy for short period of time. Contrarily, all other macroeconomic variables (trade, DI and human capital) have insignificant effects in the short run.

Table 4. Cross-sectional dependency in panel time series data.

OFDI (Dependent Variable)	Pooled Mean Group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Short Run			
Error Correction	-0.685***	-1.029***	-0.699***
	(-3.43)	(-4.59)	(-7.72)
Δ. DI	0.007	0.083	0.147
	(0.09)	(0.50)	(1.42)
Δ. Trade	-0.069	-0.083	0.026
	(-0.71)	(-0.71)	(0.94)
Δ. Inflation	0.027**	0.057	0.059**
	(2.39)	(1.55)	(2.46)
Δ. Human Capital	0.048**	-0.009	0.002
	(2.28)	(-0.14)	(0.06)
Long Run			
DI	-0.185***	-0.020	-0.258**
	(-4.11)	(-0.05)	(-2.21)
Trade	0.002	-0.019	-0.016
	(0.23)	(-0.22)	(-0.53)
Inflation	-0.012	-0.011	0.002
	(-1.28)	(-0.21)	(0.08)
Human Capital	0.069***	-0.094	0.093**
	(5.14)	(-0.91)	(2.45)
Constant	-5.020***	7.781	-8.642**
	(-3.69)	(0.43)	(-1.99)
Observations	144	144	144
Country	06	06	06
Hausman test (PMG–MG)	0.488		
Hausman test (DFE–PMG)	0.980		

Note: ***, ** and * represent significance at 1%, 5% and 10%, respectively.

Finally, in terms of the long run-scenario, our dynamic fixed effect estimator findings show that domestic investment has negative and significant effects on FDI outflows in the long run at the 5% level of significance. A one US dollar increase in domestic investment decreases foreign direct investment outflows by USD$0.2589 in the long run. Since it is economically sensible that an increase in domestic investment can have negative effects on OFDI in the economy, many local investors may withdraw their investment from foreign countries and invest in local economies if local investment pays off more than foreign investment. In addition, if the country-level quality of governance pay incentivizes local investors, it may also influence local investors to withdraw their foreign investment and invest more in local economies if the government ensures a high level of profitability from domestic production and local investment. Moreover, bilateral diplomatic relationships also influence outward FDI decisions, mainly to fulfil a political agenda. Thus, our estimations that domestic investment has negative effects on outward FDI in the long run are logically correct, particularly for GCC economies. Furthermore, our findings show that some of the macroeconomic variables (trade and inflation) have insignificant effects on OFDI in the long run, whereas human capital has positive and significant effects on FDI outflows in the long run. The finding that human capital has a positive effect on FDI outflows in the long run among GCC countries is economically feasible. GCC economies need highly skilled workers through foreign direct investment by multinational national corporations (MNCs). Transfer of technologies by MNCs to developing countries brings in economic changes and fosters productivity growth. Thus, to operate new imported technology successfully need highly skilled staff as there is a scarcity of highly skilled human capital in the local economies Therefore, it is economically justifiable that human capital has positive effects on FDI outflows among GCC countries.

4.4. Panel ARDL Estimations (Relaxing Assumption of Cross-sectional Dependency)

Since the mixed integrated order amongst the variables does not affect the efficiency of the estimations, an additional conventional stationarity check is no longer required. Furthermore, this model is appropriate for the panels with large N and T dimensions as explained below in Equation 6 and Equation 7, respectively.

$$\Delta OFDI_{it} = \mu_i + \varphi_i OFDI_{it-1} + \beta'_i X_{it} + \sum_{j=1}^{p-1} \lambda_{ij^*} \Delta OFDI_{it-j} + \sum_{j=0}^{q-1} \delta'^*_{ij} \Delta X_{it-j} + \varepsilon_{it} \quad (6)$$

$$\Delta OFDI_{it} = \mu_i + \varphi_i (OFDI_{it-1} - \theta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij^*} \Delta OFDI_{it-j} + \sum_{j=0}^{q-1} \delta^{*'}_{ij} \Delta X_{it-j} + \varepsilon_{it} \quad (7)$$

Where,

$\varphi_i = -1(1 - \sum_{j=1}^{p} \lambda_{ij})$, $\beta_i = \sum_{j=0}^{p} \delta_{ij}$,

$\lambda_{ij^*} = -\sum_{m=j+1}^{p} \lambda_{im}$, $j = 1,2, \dots\dots\dots, p-1$, and

$\delta_{ij^*} = -\sum_{m=j+1}^{p} \delta_{im}$, $j = 1,2, \dots\dots\dots, q-1$.

$$\widehat{\theta}_{PMG} = \frac{\sum_{i=1}^{N} \widetilde{\theta}_i}{N}, \widehat{\beta}_{PMG} = \frac{\sum_{i=1}^{N} \widetilde{\beta}_i}{N}; \widehat{\lambda}_{jPMG} = \frac{\sum_{i=1}^{N} \widetilde{\lambda}_i}{N}, \text{and } \widehat{\gamma}_{jPMG} = \frac{\sum_{i=1}^{N} \widehat{\gamma}_i}{N}$$

$$\text{Where, } j = 0, \dots\dots q 1, \quad \hat{\theta}_{PMG} = \widetilde{\theta}$$

Υ_{it} is the dependent variable (OFDI), μ_i is the intercept, β_{it} is the slope coefficient of independent variables and lagged dependent variable, X_{it} (DI, trade, inflation and human capital) is the vector of independent variables. Where φ_i is error correction term, it indicates adjustment of short run disequilibrium towards long run equilibrium after economic shock in the short run.

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4.5. Effects of Domestic Investment on Outward Foreign Direct Investment in Short Run and Long Run (Existence of No Cross-sectional Dependency)

The results of the pooled mean group (PMG), mean group (MG) and dynamic fixed effect (DFE) estimators are reported in Table 5. Results show that the coefficient of the error correction term is negative and significant, meaning that any disequilibrium in the short run is adjusted by 0.657% per year towards long run equilibrium. In terms of a short run scenario, inflation has positive and significant effects on foreign direct investment, similar to those reported in Table 4. A high rate of inflation is usually expected to have negative effects in the economy in the long run. However, there can be economic situations where inflation is useful and may have positive effects in the economy for a short period of time. Furthermore, our results show that macroeconomic variables (trade, DI and human capital) have insignificant effects in the short run.

Table 5. Relaxing assumption of cross-sectional dependency in panel time series data.

OFDI (Dependent Variable)	Pooled Mean Group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Short Run			
Error Correction	-0.553***	-0.911***	-0.657***
	(-3.56)	(-6.41)	(-8.25)
Δ. DI	0.001	-0.036	0.094
	(0.982)	(0.56)	(0.97)
Δ. Trade	-0.066	-0.107	0.044
	(0.531)	(-0.83)	(1.61)
Δ. Inflation	0.0230**	0.020	0.036**
	(1.86)	(1.15)	(2.04)
Δ. Human Capital	0.035*	0.053**	0.014
	(1.81)	(1.98)	(0.44)
Long Run			
DI	-0.093	0.023	-0.155
	(-1.52)	(0.10)	(-1.44)
Trade	0.037***	-0.026	0.013
	(2.83)	(-0.66)	(0.59)
Inflation	011	0.027	0.012
	(0.86)	(0.73)	(0.36)
Human Capital	0.095***	0.035	0.123***
	(7.10)	(0.53)	(3.23)
Constant	-4.72***	2.18	-4.82**
	(-3.66)	(0.33)	(-2.14)
Observations	144	144	144
Country	06	06	06
Hausman test (PMG–MG)	0.9721		
Hausman test (DFE–PMG)	0.9710		

Note: ***, ** and * represent significance at 1%, 5% and 10%, respectively.

In terms of a long run scenario, the dynamic fixed effect (DFE) estimators showed that domestic investment has insignificant effects on FDI outflows. Human capital was seen to have positive and significant effects on FDI outflows in the long run. The transfer of technologies by the MNCs to developing countries brings in economic changes and fosters productivity growth.

4.6. Panel Cointegration Approaches (For Robustness of Econometric Results)

4.6.1. Dynamic Ordinary Least Squares (DOLS)

The DOLS approach (Alcántara & Padilla, 2008) is efficient in the presence of a mixed order of integration, enabling integration of the respective variables in the cointegrated framework since the obtained cointegrating vectors from the DOLS estimators are asymptotically efficient. We estimated parameter β using the between-

dimension, group mean panel dynamic ordinary least squares estimator suggested by Pedroni (2001). The DOLS regression is presented as follows in Equation 8:

$$\Upsilon_{it} = \alpha_i + \beta_{it} X_{it} + \sum_{j=-pi}^{pi} \Phi ij \Delta X_{it-j} + \varepsilon_{it} \quad (8)$$

where β_{it} is the conventional time series DOLS estimator applied to the ith country of the panel and Φ_{ij} is the coefficient of lead and lag differences, which accounts for possible serial correlation and endogeneity of the regressors thus yielding unbiased estimates. Υ_{it} is the dependent variable (OFDI), α_i is the intercept, β_1 is the slope coefficient and X_{it} (DI, trade, inflation and human capital) is the vector of independent variables.

4.7. Fully Modified Ordinary Least Squares (FMOLS)

The fully modified ordinary least squares (FMOLS) approach was initially used by Phillips & Sul (2003) to obtain the unbiased estimators of cointegrating regressions. The FMOLS approach addresses the potential endogeneity bias problem, where the ordinary least squares (OLS) is often unable to eliminate it. Moreover, FMOLS is also able to solve potential serial correlation problems. The FMOLS estimator is asymptotically unbiased and fully efficient in the presence of a mixture of normal asymptotic properties. To estimate our model, Equation 9 below was formed:

$$Y_t = \mu_i + \acute{\beta}_t X_t + \varepsilon_t, t = 1, 2, \dots \dots . T \quad (9)$$

Where ε_t is the error terms, Υ_{it} is the dependent variable (OFDI), μ_i is the intercept, $\acute{\beta}_t$ is the slope coefficient and X_{it} (DI, trade, inflation and human capital) is the vector of independent variables. The FMOLS approach is estimated by the standard Wald tests using asymptotic Chi-square statistical inference. Where the vector of regressors are characterized as I(1) and are not cointegrated individually, X_t has a first difference stationary process, as explained below in Equation 10:

$$\Delta X_t = \theta + v_t \text{ where } t = 2, 3, \dots \dots . T \quad (10)$$

Where ΔX is generated to be stationary by segregating the vector of drift parameters (θ), and v_t is a vector of I(0) or a stationary variable. This approach assumes $\xi_t = (u_t, v')'$ following a strict stationary process with zero mean and a finite positive definite covariance matrix Σ. The estimation of the FMOLS approach, mainly the parameter βi, is retrieved in two steps: first, Y_t is modified for the long-run T interdependence of u_t and v_t; second, $\hat{\mu}_t$ presents identically and independently distributed data, like the residual of the OLS estimator.

4.8. Effects of DI on Outward OFDI in the Long Run

The DOLS result estimates for the group mean panel are reported in Table 6. The panel estimates show statistically significant negative effects of DI on OFDI in the long run, confirming the results reported in Table 4. The group mean estimator for the coefficient of DI is -0.128, implying that a 1 percentage point increase in DI decreases OFDI by 0.128 % in the long run (i.e., an increase of one US dollar decreases OFDI by USD$0.128 in the

long run). Other control variables (trade and human capital) have positive and significant effects on OFDI in the long run and inflation has insignificant effects on OFDI in the long run. Our FMOLS estimators show that trade, inflation and human capital have positive and significant effects on OFDI in the long run. We focused on the DOLS estimator to explain our main estimated results, since its superiority over PMG and MG is confirmed by the Hausman specification test.

Table 6. Dynamic OLS /feasible modified OLS approaches.

OFDI (Dependent Variable)	DOLS (Mean Group Estimator)	FMOLS (Mean Group Estimator)
DI	–0.1285**	–0.0178
	(–2.16)	(–0.61)
Trade	0.0147*	0.0189***
	(1.72)	(4.41)
Inflation	0.0591	0.0460***
	(1.15)	(3.93)
Human Capital	0.0804***	0.0561***
	(3.43)	(5.13)
Linear Trend		0.0056*
		(1.71)
Constant	–4.59**	–5.59***
	(–2.18)	(–5.48)
Hausman test (DOLS–FMOLS)	0.9564	
Leads and lags (DOLS)	2	
Eq trends and lags (FMOLS)	1	

Note: ***, ** and * represent significance at 1%, 5% and 10%, respectively.

5. CONCLUSION

This paper primarily analyzed the impact of domestic investment (DI) on outward foreign direct investment (OFDI) in short run and long run. We have applied cross-sectional augmented autoregressive distributed lag (CD-ARDL) and panel ARDL approaches for our estimations. Furthermore, we have also applied the dynamic ordinary least squares (DOLS) and feasible modified ordinary least squares (FMOLS) econometric approaches to check the robustness of our estimations. Our estimations reported in Table 3 show that our findings are more consistent by removing cross-sectional dependence and non-stationary problems in the error of the estimates by applying the CD-ARDL approach. This modelling approach allows us to present the most robust and consistent estimations for economic advisors and policy makers of these countries in the formulation of policies to develop the economies of these countries to be more efficient and sound in the long run. Confirming the previous studies of Feldstein (1995); Desai et al. (2005) and Andersen & Hainaut (1998), this study finds, generally, that domestic investment has a significant and negative effect on foreign direct investment outflows in the long run overall for the countries in the panel. However, domestic investment has insignificant effects on outward foreign direct investment in the long run if we assume that there is no cross-sectional dependency in our GCC countries, as reported in Table 5. If we compare our estimations in Table 4 with the estimations of Table 5, we find that they may be biased if we ignore cross-sectional dependency in the data set sample of the GCC countries. Our DOLS findings strongly support the CD-ARDL estimations when we applied robust checks to our cross-sectional dependency estimation results. Our research analysis shows that ignoring cross-sectional dependency among the countries which are parallel in economic structure, economic policies and financial development may result in misleading information and biased economic estimations. Our estimations show that a 1% increase in domestic investment decreases foreign direct investment outflows by 0.258% in the long run, as reported in Table 5. From our data set and graphical trends, we found that when DI increases, FDI outflows behave in the opposite way, which also strongly aligns with our econometric findings of a negative impact of DI on OFDI in the long run for Gulf Cooperation Council economies.

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