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Panel Causality Relationship among FDI and Trade (Evidence from 16 Advanced Europe Countries)

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Abstract

This study applied panel unit root, panel co-integration and panel causality tests to distinguish the position of short run and long run causality among foreign direct investment (FDI) and trade in a panel of 16 advanced European countries over the period 1976-2008, 528 observations were incorporated into the model. The results show that there is bidirectional causality among FDI-Export and FDI-Import in the short run while the long run causality runs from import and export to FDI. Furthermore, there is unidirectional causality from FDI to total trade in the long run and bidirectional causality in the short run. Therefore, increase in FDI led to increase in export and import in the short run and these led to increase in total trade in the short run. Thus, attractive FDI policies in trade oriented economies can be used to promote the level of trade, and expanding trade policies are helpful as well to attract more FDI in these set of countries.

Keywords: FDI, Trade, Panel Causality, Europe.

1- Introduction

Foreign direct investment and trade are at the core of the globalization process and stand for the mobility of capital and goods across borders. They both build and increase the complexity of economic interdependence among distinct economies. For policy making, it is very important to have a good understanding of the economic and social effects associated with FDI and trade. In the international economics and business literature, the following

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two aspects of possible linkages between FDI and international trade are sometimes discussed: (1) whether FDI is a substitute for, or a complement to, international trade; and (2) whether FDI causes international trade or the other way round.

As to the first aspect, the numerous studies have examined the relationship between trade and FDI. The results of these studies vary considerably from country to country and from industry to industry. Blomström et al. (1988) found that the relationship between FDI and exports is negative in some industries suggesting that FDI and exports are alternatives. Belderbos and Sleuwaegen (1998) reached the same conclusion. Svensson (1996) used firm level data for Sweden to estimate the impact of FDI on exports. Svensson found a negative linkage between exports and FDI for finished goods and a positive relationship between exports of intermediate goods and FDI. Blonigen et al. (2004) found that tariff-jumping FDI has significant larger negative effects on the US domestic firms' exports than other types of FDI. They argued that Trade frictions (commercial policy, distance and transportation cost, etc.) encourage foreign producers to "jump" trade barriers by replicating similar plants in different markets. Such investment patterns are called horizontal FDI. Beugelsdijk et al. (2008) argued that horizontal FDI and trade are largely substituting and an increase in trade decreases such investment. In contrast, cost gaps may encourage producers to break up the production process, putting labor intensive stages of production in low wage countries, and the more capital intensive stages of production (R&D, assembly, headquarter services, etc.) in industrialized countries. Such investment patterns are called vertical FDI.

Empirical studies such as Pfaffermayr (1996), Clausing (2000), Lipsey and Weiss (1984), Rugman (1990), and Brainard (1993, 1997), using firm level data found FDI and exports to be complementary. Using bivariate VECM models, Fukasaku et al. (2000) found that the positive affect of FDI on trade is stronger in trade oriented economies. Moreover, FDI inflows are more sensitive to changes in exports in Southeast Asian nations than in their Latin American counterparts. Similarly, Dunning et al. (2001) argued that the growth of trade in Korea and Taiwan tends to be positively associated with FDI. Do and Levchenko (2004), Lane and Milesi-Ferretti (2004), Rose and Spiegel (2004) and Swenson (2004) examined the interaction between FDI and trade and pointed out that a larger inflow of FDI leads to higher

volume of trade as well as other benefits such as increase in the rate of total factor productivity growth. By making use of firm level data on the UK, Driffield and Love (2007) showed that FDI has contributed to productivity increase exports. By making use of highly aggregated data on 44 host countries over the period 1983-2003, Beugelsdijk et al. (2008) argued that horizontal FDI and trade are largely substituting and an increase in trade decreases such investment. Using a gravity model, Anwar & Nguyen (2010) found a complementary relationship between FDI and exports and FDI and imports in Vietnam.

While some attention has been paid to the substitution–complement relationships, explicit testing for causality between FDI and trade is rare. Adopting a time series approach, Pfaffermayr (1994) examined the characteristics of the quarterly data for outflow FDI and trade from the Austrian economy during 1969–1990. It was found that there exists significant causality of Austrian outward FDI and exports in both directions. Using ECM techniques, Zhang & Felingham (2001) found that for the People' Republic of China (PRC) as a whole, the relationship between FDI and exports is bidirectional. Liu et al. (2001), based on a panel of bilateral data for China and 19 home countries/regions during 1984–1998, found that the growth of China's imports triggers the growth in inward FDI from a home country, which, in turn, triggers the growth of exports from China to the home country. Dritsaki et al. (2004) investigated the relationship between Trade, Foreign Direct Investment (FDI) and economic growth for Greece over the period 1960-2002. They found that economic growth, trade and FDI appear to be mutually reinforced under the open-door policy. Using Geweke's decomposition method, Aizenman & Noy (2005) found a strong two-way linkage between FDI and manufacturing trade. By conducting multivariate causality tests in the vector error correction model framework, Liu et al. (2009) found two-way causal connections between trade, inward FDI, inward merger and acquisitions (M&As) and growth in Asian economies. Jayachandran & Seilan (2010) investigated the relationship among Trade, Foreign Direct Investment (FDI) and economic growth for India over the period 1970-2007. They found that there is a causal relationship among the examined variables.

In this paper, we examine the short run and long run causality relationship among foreign direct investment (FDI) and export, import and

total trade (export plus import) in 16 advanced Europe countries over the period 1976-2008. This empirical study is based on a panel causality test by using Error Correction Model. The remainder of this paper is structured as follow. Section 2 reviews theoretical literature on FDI–trade relations. The data and methodology are described in Section 3. The results will be discussed in Section 4, and Section 5 provides conclusions and policy implications.

2- Theoretical considerations

Initially, the relationship between FDI and trade is far from being unambiguous, from a theoretical point of view. The traditional view (Mundell, 1957) stated, in the context of the (two-good, two-factor, two-country) Heckscher-Ohlin trade model, that goods movement and factor movements were alternatives of one another. Factor mobility induced by differences in factor prices among countries would eliminate price differentials in both goods and factor markets, thereby removing the basis of trade. Then trade impediments would enhance factor movements and vice versa, so that exports and FDI would be alternative means of involvement in foreign markets. However, this result would be highly dependent on the specific assumptions made (Schmitz and Helmberger, 1970). Later studies showed that trade and foreign investment might be complementary rather than substitutes. For instance, once a certain threshold is reached, exports could lead to FDI in the destination market, since exports aim to exploit certain advantages intrinsic to the host country as well as trying to satisfy the specific requirements of that market in the best manner. Hence, FDI would be a means of consolidating and expanding export markets (Purvis, 1972).

More generally, Markusen (1983) discussed several models in which an increase in the volume of trade is due to factor movements generated by international factor-price differences. Retaining the assumption of identical relative factor endowments between two countries, several models embodying alternative bases for trade are presented (including differences in production technology, production taxes, imperfect competition, returns to scale, and factor market distortions). In all these cases, factor mobility leads to differences in factor proportions, which functions as an additional motive for trade in goods. Therefore, Markusen (1983) determined, Mundell's result of trade in goods and factors being substituted that would be a special case

that would only be true if trade was based on differences in relative factor proportions (i.e., for the Heckscher-Ohlin trade model). On the other hand, and starting from Hymer's (1976) pioneering contribution, the theories of the multinational enterprise (MNE) state that MNEs must encompass some particular advantage over domestic firms in the host country. Given such an advantage of ownership, it must be beneficial for MNE to internalize it within the firm by FDI, if the foreign country possesses a location advantage over the home country, thereby making FDI more profitable than exporting. This understanding is the essence of the well-known Dunning's OLI (ownership-location-internalization) paradigm (Dunning, 1977).

These considerations have been incorporated into formal general equilibrium models in which MNEs arise endogenously. Helpman (1984) and Helpman and Krugman (1985) illustrated that the degree of specialization is a positive function of relative factor endowments. If differences in factor endowments were not substantial, a capital-abundant country would produce capital-intensive differentiated goods at home and exchange them for the labour-intensive homogeneous good from a labour-abundant country. However, if there were substantial differences in factor endowments, the capital-abundant country would tend to export headquarters services (such as R&D) into the labour-abundant country in exchange for finished varieties of a differentiated good and a homogeneous good, rather than simply exporting the differentiated good. Thus, FDI generated complementary trade flows from the labour-intensive country. In addition, parent firms may export intermediate inputs to their subsidiaries if vertical integration was involved.

As noted by Markusen and Maskus (1999), the model developed by Helpman captures the notion of vertically integrated firms but does not allow FDI to happen among very similar countries. Ethier (1986) found that both a greater uncertainty faced by the firm and (unlike the models by Helpman, 1984; and Helpman and Krugman, 1985) a greater similarity in factor endowments among countries make FDI more likely, leading to two-way FDI and a relatively higher intra industry and intra firm trade. Along similar lines, Barrios (1997) showed that, for a peripheral country engaged in a process of economic integration; both intermediate imports and exports of the final good would be higher as integration deepens. The previous models referred to “vertical” FDI, i.e., the situation in which MNEs locate each

stage of the production process in different countries according to relative cost advantages, which results in FDI and trade being complemented. However, there are also models for "horizontal" MNEs that are trying to gain an easier access to foreign market (for reasons of transport costs or of being closer to the final customer), which might lead to FDI and trade being substituted rather than complements.

Brainard (1993) developed a two-sector, two-country model where firms in a differentiated-products sector choose between exporting and FDI as alternative methods of foreign market penetration. Increasing returns to scale characterized this sector at the firm level due to some specialized input (such as R&D), scale economies at the plant level, and transport costs increasing with distance. From here, equilibrium with MNEs is more likely higher than the scale economies are at firm level relative to those at plant level and higher than the transport costs are relative to plant-level scale economies. Also, for intermediate ranges of transport costs and firm-level scale economies relative to those at the plant level, there can be equilibrium with MNEs and domestic firms in the differentiated sector, with two-way trade in both differentiated products and intangible inputs. Similar results were found by Markusen and Venables (1998), who add an explicit consideration of the role of asymmetries between countries to previous models, so that MNEs become more important relative to trade as countries' resemblance increase in size and relative endowments and as world income grows.

Notice that the above models, and in particular those concerning vertical FDI, are based on the fact that MNEs possess some specific and highly specialized intangible inputs, i.e., services, which can be easily disseminated to different geographical locations. In this way, assuming there is an efficiently operating market for these knowledge-intensive services, several possible configurations may arise: trade in goods, trade in goods and in services, or trade in goods and FDI in services (see van Marrewijk, Stibora, and de Vaal, 1996). An integrated treatment of vertical and horizontal models of FDI has been provided (see Markusen, 1997, and Markusen and Maskus, 1999). According to what the authors call the "knowledge-capital model", the existence of skilled labor-intensive and knowledge-based assets that can be easily supplied to separate geographically production facilities would cause vertical MNEs, which would locate their single plant and headquarters in different countries depending on factor prices and market

sizes. On the other hand, the "public good" character of these knowledge-based assets for these geographically separate production facilities would cause horizontal MNEs, with plants producing the final good in several countries. In this way, vertical MNEs would dominate when countries are very different in relative factor endowments, and horizontal MNEs would dominate when countries are similar in both relative factor endowments and size, and trade costs are moderate to high.

In terms of causality, we can envision a two-way causality between trade and FDI. Trade cans be expected to lead FDI since FDI in developing countries is often trade replacing. For instance, a primary motivation for FDI in manufacturing is searching for markets. Thus, at first MNE will typically export to serve the domestic market in a host country because trade is easier and less risky than FDI, and after learning more about the economic, political, and social conditions and gaining more experience, home country firms may set up an affiliate to serve that market directly. The resulted FDI then replaces exports from the home country (the country in which the MNE is headquartered) to the host country. On the other hand, FDI can also be expected to lead trade. This can happen in three ways. First, conscious policy choices by host countries can drive FDI into the traded goods sector and thus directly increase production of traded goods. Second, completely apart from policy-induced FDI in the traded goods sector, we might expect more FDI in the traded goods sector to lead to more traded goods production for domestic firms as well, through spillover effects (for e.g., information about foreign markets or technical knowhow passed on from foreign firms to domestic firms through either explicit information sharing arrangements or through implicit channels such as labor turnover). Third, FDI often involves affiliates of MNEs operating in host countries and selling to third-country markets. Completely apart from directly increasing the host country's exports, this kind of FDI may also increase the host country's imports to the extent that it represents vertical FDI. Thus, especially during the initial years of operation, the lack of locally available inputs may force the foreign affiliate to import these from the parent MNE in the source country, but such imports may taper off over time as they become available domestically in the host country.

3- Data and Methodology

This study used annual data for 16 advanced European countries[1] during1976 till 2008; they are obtained from World Development Indicator (WDI). Variables that used are: EX is Export of goods and services at constant 2000 US$, IM is Import of goods and services at constant 2000 US$, TR is trade of goods and services at constant 2000 US$, FDI is Accumulative Foreign direct investment, net inflows at constant 2000 US$ with considering 10% depreciation rate and Y is gross domestic product at constant 2000 US$. Notice that Logarithmic forms of all the variables are used in the empirical analysis.

To test causality relationship between FDI and trade three steps have been performed. At first, order of integration in the variables was investigated using panel unit root tests proposed by Levin et al. (2002), Im et al. (2003), Maddala and Wu (1999) and Choi (2001). Second, long run relationship among variables with order of integration one was examined using Kao's (1999) panel co-integration. Third, the panel vector error correction model was used to survey long run relationships and short run dynamic adjustment between FDI and trade.

Engle and Granger (1987) showed that if two non-stationary variables are cointegrated and there is long run equilibrium relationship then, a vector auto regression (VAR) in firs differences will be mis-specified and dynamic error correction needed to specify a model. Therefore, VAR model should be augmented with one period lagged error correction term that is obtained from the co-integrated model. The Granger causality test that was used is based on the following equations:

$$\Delta FDI_{it} = C_{1i} + \sum_q \theta_{11iq}\Delta FDI_{it-q} + \sum_p \theta_{12ip}\Delta Y_{it-p} + \sum_p \theta_{13ip}\Delta EX_{it-p} + \mu_{1i}ECT_{it-1} + \varepsilon_{1t}$$

$$\Delta EX_{it} = C_{2i} + \sum_q \theta_{21iq}\Delta EX_{it-q} + \sum_p \theta_{22ip}\Delta Y_{it-p} + \sum_p \theta_{23ip}\Delta FDI_{it-p} + \mu_{2i}ECT_{it-1} + \varepsilon_{2t}$$

$$\Delta FDI_{it} = C_{3i} + \sum_q \theta_{31iq}\Delta FDI_{it-q} + \sum_p \theta_{32ip}\Delta Y_{it-p} + \sum_p \theta_{33ip}\Delta IM_{it-p} + \mu_{3i}ECT_{it-1} + \varepsilon_{3t}$$

$$\Delta IM_{it} = C_{4i} + \sum_q \theta_{41iq}\Delta IM_{it-q} + \sum_p \theta_{42ip}\Delta Y_{it-p} + \sum_p \theta_{43ip}\Delta FDI_{it-p} + \mu_{4i}ECT_{it-1} + \varepsilon_{4t}$$

$$\Delta FDI_{it} = C_{5i} + \sum_q \theta_{51iq}\Delta FDI_{it-q} + \sum_p \theta_{52ip}\Delta Y_{it-p} + \sum_p \theta_{53ip}\Delta TR_{it-p} + \mu_{5i}ECT_{it-1} + \varepsilon_{5t}$$

1 - Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and United Kingdom.

$$\Delta TR_{it} = C_{6i} + \Sigma_q \theta_{61iq} \Delta TR_{it-q} + \Sigma_p \theta_{62ip} \Delta Y_{it-p} + \Sigma_p \theta_{63ip} \Delta FDI_{it-p} + \mu_{6i} ECT_{it-1} + \varepsilon_{6t}$$

In the equations, Δ denotes first difference of the variables and ECT_{it-1} is the lagged residual that derived from the long run co-integration relationship. μ is the short run adjustment coefficient and shows that how fast the values of the variables of the system come back to the long run equilibrium levels when they deviate from it. Thus, μ shows the long run equilibrium relationship among the variables. Also, ε is disturbance term that assumed to be uncorrelated with mean zero. It is considerable that Gross domestic product variable are included in equation (1) to (6) demonstrate differences between direct and indirect causality relationship among FDI and trade.

In this study, the panel causality relation examined through testing whether group of the coefficients is statistically different from zero that is based on standard F-test of equations. Furthermore, the negative and statistically significant error correction term shows that there is long run causation.

4- Empirical Results and Discussion

At first, panel unit root test was employed to determine the integration properties in the model. So LLC (2002) and IPS (2003) and Fisher-type tests of Maddala and Wu (1999) and Choi (2001) using ADF and Phillips–Perron type individual unit root tests employed and the result of these tests presented in table 1. The LLC and IPS statistics for the levels and first difference of gross domestic product, FDI, export, import and Trade in logarithmic forms show that all the variables are integrated of order one or I(1). Therefore, we test whether there is co-integration relationship among the variables that exist in the models. The null hypotheses in these tests are unit root.

Table 1: Results of Panel Unit Root Tests

Tests\Variables	Y	FDI	EX	IM	TR
Level					
LLC	-0.60016 (0.2742)	5.18355 (1.0000)	-4.43428 (0.3320)	-2.02850* (0.0213)	-0.98737 (0.1617)
IPS	4.94932 (1.0000)	-0.38101 (0.3516)	0.75540 (0.7750)	-1.36008 (0.0869)	-0.17396 (0.0443)
ADF	7.77153 (1.0000)	33.9107 (0.3755)	22.4968 (0.8935)	36.0913 (0.2831)	27.7419 (0.6821)
PP	18.7660 (0.9695)	166.703* (0.0000)	15.0499 (0.9952)	23.6679 (0.8562)	18.9657 (0.9670)
First difference					
LLC	-6.83114* (0.0000)	-5.07464* (0.0000)	-8.87616* (0.0000)	-7.80636* (0.0000)	-7.37599* (0.0000)
IPS	-7.95869* (0.0000)	-11.6590* (0.0000)	-9.50784* (0.0000)	-9.54742* (0.0000)	-9.04252* (0.0000)
ADF	124.355* (0.0000)	188.737* (0.0000)	151.058* (0.0000)	151.990* (0.0000)	143.255* (0.0000)
PP	127.909* (0.0000)	295.694* (0.0000)	207.784* (0.0000)	198.324* (0.0000)	200.328* (0.0000)

Notes: probability values are in parenthesis; ∗ denote statistically significant at the 5% level

The Kao's (1999) ADF test is applied to examine the existence of a long run equilibrium relationship among the variables that included in the models. The results of Kao co-integration test are reported in table 2. Base on the results, the existence of long run relationship among the variables was supported. Thus, we use the estimation results without concerning about spurious regressions. The null hypothesis in this test is no co-integration.

Table 2: Results of Kao's Residual Panel Co-integration Test

Models	t-Statistic	Probability
FDI=f(Y,EX)	-2.397030	0.0083*
EX=f(Y,FDI)	-4.260920	0.0000*
FDI=f(Y,IM)	-1.976619	0.0240*
IM=f(Y,FDI)	-3.938992	0.0000*
TR=f(Y,FDI)	-3.391381	0.0003*
FDI=f(Y,TR)	-2.207559	0.0136*

Notes: probability values are in parenthesis; ∗ denote statistically significant at the 5% level

Now, we estimate the long run coefficients of the panel models. Hausman (1978) test is a common method for testing that random effect is uncorrelated with explanatory variables. Therefore we used this test to compare fixed and random effect estimate. The results of Hausman (1978) test that reported in table 3 show that null hypothesis is rejected in all the models; because there is structural variation among selected countries and to perceive the effect of this condition on exogenous variable. Thus, fixed effect estimation is more appropriate for estimation targets in this study.

Table 3: Description of the Hausman Test

Models	Chi-Sq. Statistic	Probability
FDI=f(Y,EX)	40.082298	0.0000*
EX=f(Y,FDI)	131.459522	0.0000*
FDI=f(Y,IM)	74.843816	0.0000*
IM=f(Y,FDI)	171.039745	0.0000*
TR=f(Y,FDI)	169.935399	0.0000*
FDI=f(Y,TR)	36.069083	0.0000*

Notes: probability values are in parenthesis; ∗ denote statistically significant at the 5% level

The results of long run coefficients based on fixed effect estimation reported in table 4. As to the table 4, we investigated that most of the coefficients are significant at 5% level of significance. The results showed that the effect of gross domestic product has positive effect on FDI, export, import and trade. Also, we found that export, import and Trade have positive effect on foreign direct investment. Coefficients showed that export stimulate FDI similar to import; One percent increase in export leads to 0.73 percent increase in FDI and in reverse one percent increase in import leads to 0.72 percent increase in FDI. Also, the impact of FDI on export and import is positive and approximately equivalent.

The result support De Mello & Fukasaku (2000), they found a positive effect of FDI on trade. These result were consistent with their theoretically discussions that the effect of FDI on trade is stronger in trade oriented economies. Furthermore, our result is the same as Dunning et al. (2001). Table 4 shows that Heckscher-Ohlin trade model is not accepted and it supports the idea that goods and factor movement are complemented.

We found that more FDI is accompanied with more spillover effects such as increased total factor productivity, innovations, modern technology and these factors improve local firms' export ability. Also, FDI improve export through consolidating and expanding export markets. Therefore, factor mobility associated with differences in factor proportions stimulates trade in goods. This showed that these countries are successful in driving FDI into the exporting good sectors, and as a result production of exportable goods increases. Export oriented FDI in these countries lead to trade creating since it could promote export. Also, there is indirect effect of FDI on Export, competition between MNEs and local firms lead to promote local firms' export propensity for protecting their markets.

Table 4: Estimated Long Run Coefficients

Dependent Variable:	FDI	FDI	FDI	EX	IM	TR
explanatory variables:						
Intercept	-39.64950* (0.0000)	-42.42057* (0.0000)	-32.48802* (0.0000)	5.177631* (0.0124)	-22.86159* (0.0000)	-4.673267* (0.0503)
Y	1.573290* (0.0000)	1.668679* (0.0000)	0.723112* (0.0050)	0.824713* (0.0000)	1.825569* (0.0000)	1.222642* (0.0000)
EX	-	0.731244* (0.0000)	-	-	-	-
IM	0.720965* (0.0000)	-	-	-	-	-
FDI	-	-	-	0.014574* (0.0000)	0.008965** (0.0569)	0.010526* (0.0017)
TR	-	-	1.284872 (0.0000)*	-	-	-
AR(1)	0.839242* (0.0000)	0.841743* (0.0000)	0.829957* (0.0000)	0.985975* (0.0000)	0.932758* (0.0000)	0.990144* (0.0000)
R-Squared	0.996521	0.996206	0.996332	0.999277	0.999559	0.999760
Adjusted R-Squared	0.996394	0.996068	0.996198	0.999250	0.999543	0.999751
F-Statistics	7846.266*	7192.365*	7439.835*	37846.64*	62085.02*	114030.1*
Durbin Watson	1.805843	1.795324	1.800236	1.882526	2.091637	1.989361
Total Observation	512	512	512	512	512	512

Notes: probability values are in parenthesis; * and ** denote statistically significant at the 5% and 10% level

The results showed that export has a positive and significant effect on FDI in these set of countries. This show that exporting activity of host country shows the international competitiveness of the local firms and

provides the information about emerging opportunity that exists in these countries. Therefore, higher export of host country sends a signal to the foreign direct investors that there is potential market for their economic activity in these countries. This condition associated with lower risk and uncertainty for foreign investor, attached with FDI, leads to stimulate FDI in these set of countries. Thus, at first, firms trade in foreign market and learn about the market conditions (economic, social, political, ruling and; etc.) and then establish a subsidiary company in the host country which after some period MNCs start to exports.

Table 4 shows that increase in import leads to rise in FDI in these countries. Therefore, MNEs search for markets through export to target country because it made easier and less risky way against FDI. Then MNEs tend to replace trade with FDI after learning more about target market. Thus, FDI is attracted to the host country to produce imported product locally.

Finally, from table 4, it is investigated that FDI inflows stimulate import through host country growth because FDI leads to increase in country market through expanding economy by the effects on growth that it stimulates import. Foreign direct investors import basic components and intermediate inputs from abroad - including MNEs home country- to use for add value in the host country and to satisfy the high quality standard required by the international market. The scarcities of locally available inputs force foreign affiliate to import from parent MNEs in the source country. Also, export oriented FDI lead to promote home country exports and consequently imports of host country are increased. Therefore FDI and import are complementary in these set of countries.

Table 5: Panel Granger Causality Tests

Dependent Variable	Δ FDI	Δ FDI	Δ FDI	Δ EX	Δ IM	ΔTR
explanatory variables:						
Intercept	-0.009914 (0.2819)	-0.014182 (0.1584)	0.003680 (0.188186)	0.041130* (0.0000)	0.010086* (0.0008)	0.025419* (0.0000)
Δ Y	1.036107* (0.0005)	1.493391* (0.0000)	1.602910* (0.0162)	0.862654* (0.0000)	1.634806* (0.0000)	1.286683* (0.0000)
Δ EX	-	0.460893* (0.0000)	-	-	-	-
Δ IM	0.541156* (0.0000)	-	-	-	-	-
Δ FDI	-	-	-	0.023782* (0.0000)	0.016168* (0.0016)	0.016921* (0.0000)
Δ TR	-	-	0.996867 (0.0015)*	-	-	-
ΔEX(-1)	-	-	-	-0.256312* (0.0005)	-	-
ΔIM(-1)	-	-	-	-	-0.083727* (0.0412)	-
ΔFDI(-1)	0.566768* (0.0000)	0.539425* (0.0000)	0.251893* (0.0000)	-	-	-
ΔTR(-1)	-	-	-	-	-	-0.180206* (0.0004)
ECM(-1)	- 0.534294* (0.0000)	-0.518092* (0.0000)	-0.155443* (0.0005)	0.368876* (0.0000)	0.007851 (0.8816)	0.228382* (0.0005)
R-Squared	0.506885	0.489768	0.124338	0.493867	0.559823	0.609203
Adjusted R-Squared	0.487202	0.469402	0.117204	0.473664	0.542253	0.593604
F-Statistics	25.75223*	24.04788*	17.42960*	24.44545*	31.86232*	39.05395*
Durbin Watson	1.919803	1.922207	2.037107	1.942545	1.974171	2.014093
Total Observation	496	496	496	496	496	496

Notes: probability values are in parenthesis; * denote statistically significant at the 5% level

Whereas variables that included in the models are co-integrated, we augmented the panel VAR model with the lagged error correction term. Therefore, the speed of adjustment to equilibrium aftershocks and significance of the long run causation are derived with using this technique. The negative and significant coefficients of lagged error correction term (ECM) supported the long run causality between variables. The results of a panel Granger causality among variables are shown in table 5. The results show that there is no long run causality from FDI to export and import. Because the lagged error correction terms for these models are the positive.

And, there is short run causality from FDI to export and import that it is shown from significant coefficient of FDI in these models. Also, from the panel Granger causality that reported in table 5, it was investigated that there is short run bidirectional causality between FDI and trade while the long run causality runs from trade to FDI. Thus, there is unidirectional causality from trade to FDI in the long run.

5- Conclusion and Policy Implication

In this study, we used panel data technique to examine the causality link among 1-FDI and export, 2-FDI and import 3-FDI and trade in 16 advanced European countries. Therefore panel unit root test and panel co-integration techniques employed. The results of panel unit roots showed that there are unit roots in equations. Therefore, panel co-integration test applied to examine the existence of long run relationship among variables that are included in equations. Results of panel co-integration tests showed that there are long run relationships among the unit root variables. The data that used in this study extracted from World Development Indicator (WDI) during 1976 to 2008.

Empirical results show that gross domestic product has positive and significant effect on export, import, FDI and trade. Also, we find that export and import have positive and significant effect on FDI; therefore it led to increase in trade openness that associated with more FDI. Base on the results, the impact of export on FDI is similar to import and an increase in export or import leads to increase in FDI. Thus, Hecksher-Ohlin trade model rejected the proposition that said goods movement and factor movements were substituting for one another and both exports and imports are complementary to FDI.

This study showed that FDI promote export ability of these countries through spillover effects such as more total factor productivity, modern technology, innovations; etc. Also, FDI leads to improvement in export through consolidating and expanding the markets. Therefore, these countries are successful in driving FDI into export oriented sectors. Also, the results showed that higher level of export is associated with more FDI. Whereas there is this fact that exporting activity of host countries shows the international competitiveness of local firm, this show that higher level of

export in host country send a signal to the foreign investor that there is potential market in these countries.

Finally, we found that increase in import lead to increase in FDI in these set of countries. Therefore, MNEs search for market through export and after learning about the condition of market replace export with FDI. Thus, FDI derived to produce imported product locally. In polar, the scarcity of inputs in the host country lead to import these inputs from parent MNEs in the source country. Also, FDI stimulate the imports of host country through expanding the economy. Short run and long run causality test showed that there is bidirectional causality among FDI-export and FDI-import in the short run but there is unidirectional causality from export and import to FDI in the long run. In continue unidirectional causality from FDI to trade supported in the long run and bidirectional causality supported in the short run. Thus, attractive FDI policy suggested stimulating the level of trade and trade openness policies proposed to attract more FDI in these set of countries. Also, deriving FDI into the exportable sectors in the long run improve the level of export in these set of countries.

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