# Analysing major determinants of European FDI into the Mediterranean countries

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*Abstract*— **Foreign direct investment (FDI) is known as a very relevant driver of economic growth and has found increased attention in recent trade research. Existing theories differ, however, in their conclusion regarding the relation between trade in goods and FDI: they appear to be either complements or substitutes depending on the theory applied and specific country conditions. Benefits or losses for individual member countries resulting from these different relationships are relevant for evaluating the effects of regional trade areas as established by the Euro-Mediterranean Partnership. This paper offers an empirical analysis of the connection between trade and FDI flows in the agribusiness sector in the context of the Euro-Mediterranean partnership. It contributes to the limited literature in this area by providing an overview on relevant theories and their conclusion on the relationship between trade and FDI. Determinants implied by the single theories are identified and reasonable proxies derived for the carried out econometric analysis. The empirical analysis shows mixed evidence on the complementary or substitutive relationship of FDI and trade in agricultural goods. For comparison and better interpretation of determinants' impacts identified by the econometric analysis, a further analysis between the EU15 and the Mercosur countries is carried out. Finally, further research needs in this area of trade analyses are identified for the specific case of the Euro-Mediterranean Partnership.**

*Keywords*— **Foreign Direct Investment, Trade, EU-Med Partnership.**

## I. INTRODUCTION

The European Mediterranean Association Agreements (EMA) celebrated their 10th anniversary in 2005 and the related process of integration was analysed by numerous studies mainly focussing on affected trade flows e.g. [1], [2], [3]. So far hardly any analyses exist on Foreign Direct Investment (FDI) carried out by the European Union, another indicator relevant for economic development in the Mediterranean countries. Different opportunities distinguished by the degree of control exist for companies to become involved in foreign production activities: If the investor owns at least 10 per cent of the foreign enterprise then the investment is a FDI. If less than 10% is controlled, a portfolio investment is in place [4]. The investor therefore does not need to have absolute control over the enterprise but needs to be able to influence or participate in the management of the enterprise. FDI is considered to have a positive impact on economic growth and its consideration may alter conclusions on traditional trade analyses as trade flows and FDI can either be positively or negatively interlinked. A substitutional (negative) relationship appears mainly when horizontal (market seeking) FDI is undertaken, i.e. to serve customers in the foreign market. Vertical FDI locates parts of the production chain in foreign countries leading to a generally complementary (positive) relationship with trade flows [5], [6].

The role of FDI for international trade in general has long been recognised. "…, approximately two-thirds of global trade is influenced […] by past FDI decisions" [7]. In the agricultural and food industry FDI is a very important activity as well: In 2003 the overall amount of EU15 investments in these sectors was 4.2 Bn € [8]. Significant shares of these investments go to Mediterranean countries and EU-based Multinational Enterprises (MNEs) are the major foreign investors in this region. Fig. 1 outlines the development of the European agribusiness FDI flows into the Mediterranean countries based on the World Development Indicators [9].
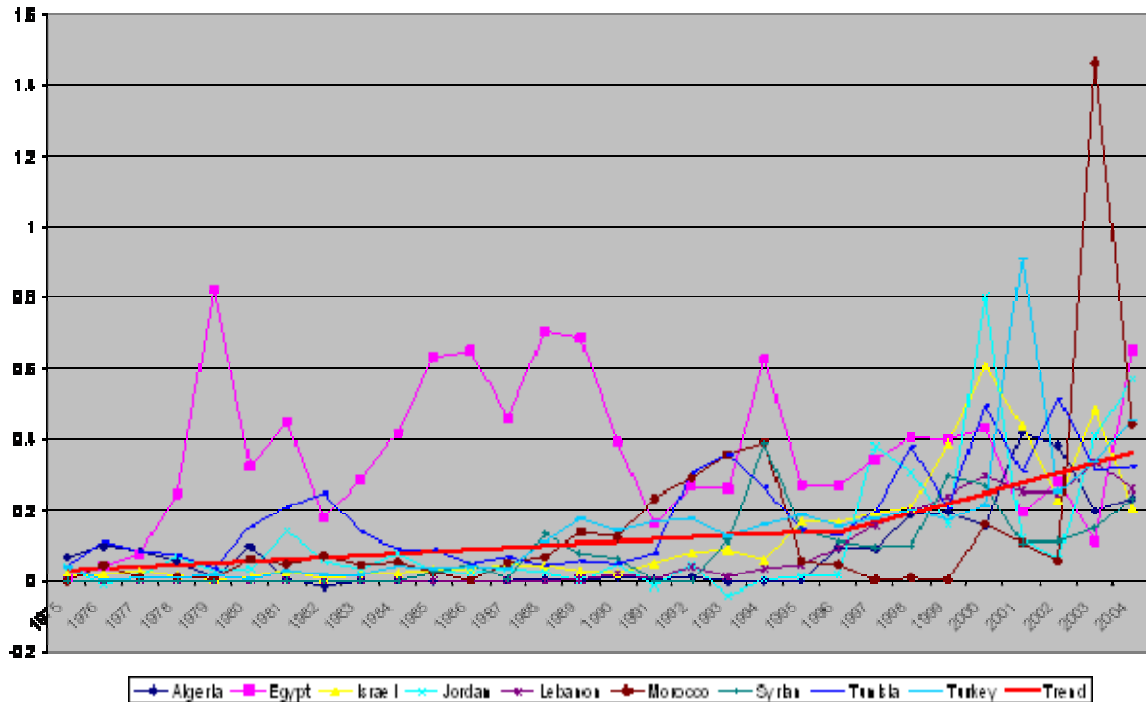
Fig. 1 EU15 FDI outflows into the different Mediterranean countries (BN €)

For a better delineation a trend line has been included which shows the average increase up to 1995 and since 1995 (where the EMA was put into place) of European FDI flows into the Mediterranean countries' agribusiness sector.

Since the introduction of the EMA the flows from the EU15 have increased as can be seen in the Fig. 1. But still the FDI flows into the Mediterranean Countries are low (2% of total European FDI flows) compared to other European regional partnerships outside of the EU15 (e.g. Mercosur countries receive 8% of the total European FDI flows) even though the trade and investment barriers are highly liberalised [10].

This paper intends to serve as a base for in-depth empirical analyses of FDI in the agribusiness sector in the context of the European-Mediterranean partnership. Furthermore, only few researchers have focused on the agricultural and food sector and even less have empirically analysed European FDI outflows to single host countries. The empirical analysis on major determinants of European FDI flows into the Mediterranean countries will be carried out through a

regression model using an OLS estimator. The analysis will be underlined through a comprehensive literature review and secondly for a better clarification and interpretation of the relevant determinants an econometric analysis will also be undertaken with the Mercosur countries being the major host countries of European FDI outside of the EU area. The focus is only on this two host country groups as they are major agricultural trade partners of the EU15. Therefore, this is an extension to the already existing empirical studies.

The structure of the paper is as follows: in section two, an overview on the different relevant theories regarding the relationship between trade and FDI is given and relevant determinants for FDI are identified. An overview on existing empirical analyses in this area is given in the third section. Then, the empirical analysis of determinants relevant for European FDI outflows into the Mediterranean and Mercosur countries is presented. The last section concludes by summarising the results of the econometric analysis and identifying further research needs for analysing the role of FDI in the Euro-Mediterranean Partnership.

## II. THEORETICAL BACKGROUND

In order to analyse the existing relationship between FDI and trade appearing in the Euro-Mediterranean Partnership, it is important to understand the general relationship between trade and FDI and the underlying determinants. Table 1 gives an overview over the relevant theories and the derived determinants influencing FDI. The theory on FDI is not unified but rather distributed among three different branches: (1) the theory of international trade mainly dealing with origin and destination of goods as well as returns to factors; (2) the theory of the firm explaining the structure of firms also across boarders; and (3) the theory of international capital markets targeted at explaining international financing and risk-sharing arrangements. Only the combination of these three strings of literature allows for a satisfying identification of the relevant determinants for the occurrence of FDI and its relationship to trade. Each of the three strings offers a certain perspective contributing to the overall picture and providing specific determinants.

Table 1 Overview on theories relevant to FDI

| Relevant theory | Major targeted dimension | Determinants of FDI |
|---|---|---|
| International trade theory | **International allocation of production** | - Availability of resources (raw materials, labour, capital) |
| | - Comparative advantages | - Productivity level |
| | - Consumer tastes | - so far no specific studies |
| Theory of the firm | **Optimal size of an MNE** | - Degree of market inefficiencies |
| | - Transaction costs | - Ability to overcome market inefficiencies |
| | - Internalisation of imperfect markets | - Market growth rate |
| | - Ownership & locationspecific advantages | - Market size and per capita income |
| | **Ideal structure of an MNE** | - Productivity level |
| Theory of international capital markets | **Origins of finance** | - Risk diversification |
| | - Funding - Risk-bearing | - Risk of sales |
| | | - Risks of equity |
| | | - Interest rate |
| | | - Exchange rate |

### A. Theory of international trade

The focus of the theory of international trade lies on the optimal international allocation of production and the resulting directions of trade flows. This implies optimal location of each type of asset used in production. In this section capital assets are treated as a factor influencing trade, whereas section 2.3. focuses on the mechanism behind capital flows.

Most models trying to analyse the appearance of FDI are based on the Heckscher-Ohlin (HO) model distinguishing two countries, two goods and two factors where trade is driven by differences in factor endowments. The basic assumptions of the HO model are constant returns to scale, identical technologies across countries, identical and homothetic tastes, free trade in goods (but not in factors) [11]. Investigating the role of capital mobility in the two-sector HO model, [12] sets up an extreme case where capital is perfectly mobile and labour completely immobile. He first concludes that FDI and exports are substitutes. Secondly, efficiency in world production is achieved if either goods or factors move freely. A main problem of Mundell's approach is that the model is non-monetary and static. Monopolistic competition as well as multiple factors, goods and countries are not taken into account [12]. The main determinant for FDI is the availability of resources in specific countries (factor endowments). Therefore, it can be derived that the more similar two countries become the more appropriate it is that horizontal FDI is undertaken. Market size and the proximity of two markets identify horizontal FDI. Contrary to Mundell, [13] finds empirical evidence for the hypothesis that FDI and exports have a complementary relationship. In his HO based analysis he considers the elimination of barriers to factor movements between countries in the absence of protection of goods. Exports and FDI appear in a complementary way if differences in production technology, product market distortion (production taxes, monopoly, increasing returns to scale) or factor market distortion exist. Vertical FDI is positively related to the difference in labour endowments between and negatively to the similarity of the markets of two countries.

With the appearance of the New Trade Theory the assumption of constant returns to scale is eliminated and the firm starts to play a major role as considered

actor. One of the first who introduced this generalisation formally was [14] by considering market structure as an important parameter for firms' decisions on FDI. The varieties of the products are both imported and exported and thereby vertical FDI is addressed [11]. [15] introduces transportation costs and economies of scale at the plant level. He concludes that the substitutional relationship of exports and FDI depends on the trade-off between the proximity advantages (e.g. reduction of transaction costs) and scale advantages from concentrating production in a single location [15]. Regarding trade costs as a proxy for transaction costs in an international context it becomes apparent that horizontal FDI is enforced if trade costs increase. To consider the decision to set up an overseas affiliate, [16] linked the degree of intra-industry firm heterogeneity and the prevalence of subsidiary sales (due to FDI) relative to export sales. Relying on the existing literature they recognise that firms can service foreign buyers through a variety of channels in a substitutional way. The determinants for FDI are expanded by adding the firm heterogeneity in productivity at an intra-industry level [16].

### B. Theory of the firm

A major objective of this theory is the identification of the optimum size and structure of firms within an international environment as described by [17]. The main determinant for placing affiliates abroad and getting involved in FDI are existing market inefficiencies (time-lags between initiation and completion of activities, monopolistic market structures and asymmetric information) and their overcoming.[1] Certain costs of internalisation (e.g. resource cost of fragmentation, communication cost and administrative cost) appear which may outweigh the potential benefits. The more transactions are characterised through bounded rationality, uncertainty, opportunism, and specific investments the more preferable it gets to integrate the transactions into the firm [18]. Across borders this leads to a substitutional relationship between exports and FDI. Trade costs as a proxy for transaction costs again can identify

horizontal FDI in the same way as already derived through the theory of trade. [19] considers the same substitutional relationship when supplementing the internalisation advantage by two more dimensions – ownership and location-specific advantage – in his OLI-Paradigm (ownership, location, internalisation). This paradigm states that FDI will only occur if all three dimensions appear. [5] identify an empirical pattern showing that both types of possible relation (substitution and complementarity) between trade and FDI can appear depending of the firm specific productivity level. This determinant for possible relationships links the theory of trade again with the theory of the firm.

### C. Theory of international capital markets

Capital has already been addressed in the trade theory as a relevant factor explaining trade. The theory of international capital markets rather focuses on how capital flows are generated. Especially when looking at dynamic trade models the reaction of capital markets become an important determinant for FDI.

The relevant theory comprises two main models: (1) Up to the 70ies the Capital-Asset-Pricing-model (CAPM) dominated the theory [20]. It explains the value of individual investments taking risk into account. Risk is distinguished by market risk, as general sensitivity of any asset (non-diversifiable risk) and the specific risk of each investment (diversifiable risk). The market risk includes all risks for the value of an investment due to changes in market determinants (interest rate, exchange rate, consumer prices, the usual risk of sales and equity risk). The specific risk of an investment focuses more on firm and product specific risks like the product life cycle or strikes in certain sectors. Both the market and the specific risk characteristics are determinants for FDI. The relationship between FDI and exports implied in the CAPM is substitutional. (2) The Arbitrage-Pricing-theory (APT) is a more general approach than the CAPM as the individual risk for undertaking investments can be considered here in a multidimensional way: The APT focuses on the international allocation of relevant investment risks between firms and thereby defines the investment flows among countries. A main part of the theory is the complexity of decisions under uncertainty and risk

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1. [1]Externalities are not taken into account as they cannot be overcome by private actors.

[21]. According to [17] it distinguishes between three economic activities involved in the creation and exploitation of foreign assets: funding, ownership and utilisation. To fund an asset the consumption has to be postponed in order to produce the asset. Ownership includes risks as changes in the economic environment can alter the future value of the asset. Utilisation (hiring) bears risks as the productivity of the asset can be subject to transitory changes. As in the CAPM model, the APT implies risk diversification incentives as well as interest rates and the exchange rate as determinants for FDI. Again a substitutional relationship between exports and FDI follows from this model.

### D. Towards a unified theory

Up to 1996 the two branches of literature focusing either on vertical or on horizontal FDI remained separately. One branch saw multinationals as only undertaking horizontal FDI which is know to be relevant for investments among developed countries. The other assumed multinationals to only undertake vertical FDI which according to empirical studies mainly appears for investments into developing economies. [22] developed a knowledge-capital model which tried to include all the different aspects of FDI theory in one model. Hence, multinationals are allowed to undertake investments that are either horizontal or vertical and not all firms in the model do the same kind of FDI. It can be shown that vertical FDI dominates when the countries differ significantly in relative factor endowments (such as labour endowments) and in size. In contrast to that, horizontal FDI occurs when countries are similar in size and relative endowments. Furthermore, for vertical FDI to appear, trade costs should be moderate to high [22]. In subsequent work [23], this model has been specified further, by taking the theoretical predictions of recent theory and making them subject to an econometric test. On an econometric base the identified types of MNEs in [22] are linked with observable country characteristics. The impact of determinants on either vertical or horizontal FDI is determined.

### III. RECENT EMPIRICAL STUDIES ON FDI

Based on the theoretical framework pointed out before, studies have been undertaken to empirically verify the impact of the determinants identified in theory on FDI flows. An overview of past studies on the estimation of FDI determinants which either focus on the agribusiness sector (marked green) or do not have a sectoral focus, shows the estimated results for the different determinants used (Table 2). Table 2 only states the most common and significant determinants of the studies as determinants vary in the single papers according to the case studies analysed. Nearly all of the studies use simple, least squares linear regressions Few use a double log functional form, but without any apparent relevant influence on the results.

Table 2 Overview of existing empirical analysis of FDI determinants

| | Singh & Jun (1995) | Barrell & Pain (1996) | Brainard (1997) | Burnham & Epperson (1998) | Gopinath (1999) | Carr et al. (2001) | Marchant et al. (2002) | Bouoiyour (2003) | Egger & Pfaffermayr (2004) | Awokuse (2006) | Gast (2007) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SUMGDP | + | + | | + | + | + | + | + | + | + | + |
| DISGDP | | | | | | | | | | | + |
| TCOST home | | | + | | | - | | | | - | |
| TCOST host | | | + | | | + | | | | + | |
| CONPRI home | | | | | + | | | | | | - |
| CONPRI host | | + | | | | | | | | + | + |
| SKILLDIFF | | + | | | + | + | - | + | - | - | + |
| ER | - | | | | - | | + | - | | - | + |
| InvestLib | | | | | | | | | | +/- | + |
| | | | | | | | | | | | |
| Vertical FDI | + | | | | | + | + | | | | |
| Horizontal FDI | | | + | + | + | + | | + | | + | + |

The identified determinants can be grouped according to whether they indicate horizontal or vertical FDI.

Horizontal FDI dominates according to the theoretical framework if countries are relatively similar in size and relative factor endowment and face high trade costs. The sum of home and host country GDP (SUMGDP), one of the dominating determinants used, stands as a proxy for the common market size. It identifies the impact of the common market on FDI flows [32]. The predicted effect on FDI is positive as an increase in income leads to an increase of demand for variety of goods according to the theory of international trade. This gives the opportunity for new enterprises to enter the market. Hence, market seeking (horizontal FDI) is undertaken.

The distribution index (DISGDP) should have a positive effect on FDI flows as the similarity of two markets facilitates investing in the host countries for foreign investors. [33] uses a distribution index according to [31] while [23] use the squared difference in real GDP between parent country and host country. Following the theory of the firm it becomes clear that the more similar two countries the lower the implementation costs when producing in the host country as the structures are already known.

With the inclusion of the consumer price index (CONPRI) of the host and the home country the internal price differences are reflected [33]. According to international trade theory, increasing FDI flows through increasing consumer prices in the host

countries identify horizontal FDI seeking opportunities for higher profits.

In contrast to horizontal FDI, vertical FDI is indicated mainly through the determinants trade costs (TCOST) and difference in education (SKILLDIFF). It is dominant when countries similar in size have different factor endowments.

The trade costs of both the host as well as the home country are used to measure the degree of protectionism applied to discourage imports of competitive products [23]. They include costs appearing from applied trade barriers as well as transaction costs. As described in the theory of international trade, national protectionism has a negative impact on trade. An estimated negative impact on FDI flows therefore indicates a complementary relationship between trade and FDI. Hence, FDI is undertaken to seek efficiency (vertical FDI).

According to international trade theory, the impact of the difference in the education of the employees between the host and the home country (SKILLDIFF) can either be positive or negative. It stands as proxy for the different heights of wages paid wherefore the level of education is positively correlated with the wages. A significant positive effect provides empirical evidence for vertical FDI, as differences in education translate to difference in wages paid encouraging vertical MNEs behaviour in search of lower production costs [33]. A significant negative effect on FDI would indicate a horizontal behaviour of the

MNEs as the target is not to reduce production costs relative to the ones in the home country.

The exchange rate (ER) captures changes in the relative currency value between home and host country over time and is frequently considered [29]. It theoretically influences relevant prices for goods as well as capital cost with positive impact on FDI.

In the latest studies a further variable is included indicating the degree of investment liberalisation in the host countries (InvestLib). The influence mainly appears to be positive on FDI flows meaning that a higher liberalisation of the investment policy of a host country leads to higher FDI flows. The costs include costs appearing from applied investment barriers as well as transaction costs appearing through the investment. It is therefore indicated whether FDI flows react to changes in the investment environment of the host countries.

Both variables influence the volume of FDI flows, but cannot indicate whether vertical or horizontal FDI appear.

## IV. EMPIRICAL METHODOLOGY

The relationship between trade and FDI implied by the single theories guide the subsequent empirical assessment. The empirical model is primarily based on the knowledge-capital-model [23]. It serves as a starting point as the method and the resulting influences of the determinants are well known. From there, further development of the economic analysis is taken into account. The regression analysis is undertaken by looking at two host country groups: a) Mediterranean countries and b) Mercosur countries. This extension is done to give an insight into the behaviour of European MNEs in different host countries.

### A. Determinants of FDI flows

The general model includes the main determinants of the former empirical analyses outlined above and the focus in this subsection is on variations and additions.

Changes appear for the SUMGDP as the EU market is so huge compared to the host countries that the total common market would not reflect changes in opportunities for market seeking activities over time. Hence, only the size of the new market is taken ($GDP_{j,k}$). Furthermore, new variables considered are the size of the joint agribusiness market size (SUMGDP_AGR) and FDI flows lagged by one period. The latter is included to pick up the dynamic nature of FDI flows. Previous FDI flows may positively affect future flows due to lower information and transaction costs.

Additionally, a dummy variable is included that mirrors the effects of the implementation of the a) European Mediterranean Partnership in 1995 and b) the Mercosur free trade agreement in 1991. Lagged trade costs are also included as they reflect the impact of last years trade flows on FDI flows which mirrors the long-term strategy of MNEs.

Therefore the general model can be stated as

(1)

$$FDI_{i,j,k} = f(GDP_{i,j,k}, SUMDGP\_AGR_{i,j,k}, DISGDP_{i,j,k},$$
$$TCOST_{i,k}, TCOST_{j,k}, CONPRI_{i,k}, CONPRI_{j,k}, SKILLDIFF_{i,j},$$
$$DISGDP_{i,j,k} * SKILLDIFF_{i,j}, ER_{j,k}, InvestCost_{j,k}, FDI_{i,j,k-1},$$
$$Dummy_{j,k}, TCOST_{i,k-1}, TCOST_{j,k-1})$$

The subscripts i and j index the home and host countries, k stands for the year. The dependent variable ($FDI_{i,j,k}$) is the flow of foreign direct investment out of the home country into the host countries.

The interaction term $DISGDP_{i,j,k}* SKILLDIFF_{i,j}$ is expected to negatively affect FDI flows as it captures vertical FDI saying that similarities in markets with differences in factor endowments appear. Consequently, a positive impact would strongly indicate horizontal FDI.

For choosing the variables included in the model the Akaike Information Criterion (AIC) is used. It measures the goodness-of-fit of an estimated model corrected for the number of variables included [34]. The AIC is applied by checking all combinations of variables considered. The specific model is according to these two criterions individually chosen for the two host country group.

### B. Data

The data set used is a panel of eighteen countries (one home country and seventeen host countries)

covering the period from 1960 up to 2005. The home country is Europe (EU15). The host countries of the Mediterranean group are Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Syrian, Tunisia and Turkey. For the Mercosur group, the host countries are Argentina, Brazil, Paraguay, Uruguay, Venezuela, Chile and Bolivia.

Except for the exchange rate data which is obtained from the United Nations Statistics Division (2007), the data is taken from the "World Development Indicators" [9]. The data is filtered as to leave in only those observations for which all considered variables are included. The number of observations for the Mediterranean countries is reduced to 179 and to 187 for the Mercosur countries (Table 3).

The dependent variable, FDI level, can be measured in three different ways: by FDI stock, FDI flow or by level of affiliate sales. Following [33], FDI is measured in terms of FDI flows (in U.S. Dollars 2006) from the home into the host country. The use of FDI flows seems preferable given that it will more directly react to changes in the environment. Level of affiliate sales are not used regarding the small amount of data available.

The $GDP_{j,k}$ is the GDP of the single host countries. For calculating the variable $SUMGDP\_AGR_{i,j,k}$, the agricultural and food sector part of the GDP in home and host countries is used. All GDP measures are in constant 2000 U.S. Dollars.

In this study the distribution index by [31] is applied to the agricultural share of GDP of the home and host countries. The index can range from 0 to 0.5. The nearer the index is to 0.5 the more similar the two countries.

(2)
$$DISGDP_{i,j,k} = 1 - \left( \frac{AgrGDP_{i,k}^2}{AgrGDP_{i,k} + AgrGDP_{j,k}} \right) - \left( \frac{AgrGDP_{j,k}^2}{AgrGDP_{i,k} + AgrGDP_{j,k}} \right)$$

Trade costs are constructed as an index of 100 minus the agricultural GDP share of the sum of imports and exports of the food and agricultural sector. This is consistent with [32]. Trade costs are assessed for all trading partners. The closer the index is to 100 the higher the trade costs as the share of imports and exports are low.

The skilled-labour variable is measured as the average level of education in a certain year of the home country minus the average level of education in the same year of the host country.

(3)
$$SkillDiff_{i,j} = \frac{\sum_k Skill_{i,k}}{k} - \frac{\sum_k Skill_{j,k}}{k}$$

The exchange rate of the host countries over time is normalised to 2000.

In this analysis investment costs are included by taking the negative agricultural GDP share of the FDI inflows into the host countries. The higher the inflows the lower the investment costs. The predicted sign is negative as higher investment costs in the host country should lead to a decrease of FDI.

## V. ESTIMATION RESULTS

The OLS-Solver appears to be a reasonable solver for this problem statement. The Breusch-Godfrey-Test is conducted for autocorrelation as autocorrelation can lead to an upward bias in the estimation of the statistical significance of coefficient estimates when panel data are used in a regression analysis. The test shows no significant autocorrelation for both regressions [35].

The variables selected for the estimation of the Mediterranean countries is as follows:

(4)
$$FDI_{i,j,k} = f(GDP_{i,j,k}, SUMDGDP\_AGR_{i,j,k}, DISGDP_{i,j,k},$$
$$TCOST_{j,k}, CONPRI_{i,k}, SKILLDIFF_{i,j},$$
$$DISGDP_{i,j,k} * SKILLDIFF_{i,j}, InvestCost_{j,k}, FDI_{i,j,k-1})$$

The regression on the Mercosur countries includes the following variables:

(5)
$$FDI_{i,j,k} = f(GDP_{i,j,k}, SUMDGDP\_AGR_{i,j,k}, DISGDP_{j,k},$$
$$CONPRI_{i,k}, SKILLDIFF_{i,j}, ER_{i,j}, TCOST_{j,k-1}, FDI_{i,j,k-1})$$

The dummy for the implementation of the regional trade agreements is not significant.

The estimation results are presented in Table 3. For a better comparison, the predicted signs of the single variable coefficient are shown. Standard errors are stated underneath the single results of the estimated coefficient. Whether the single variable coefficient suggests if the FDI flows that are carried out into the host countries are vertical or horizontal is stated next to the estimated coefficient.

Table 3 Estimated Results

| Model | Predicted Sign | Mediterranean countries | Mercosur countries |
|---|---|---|---|
| $GDP_{j,k}$ | + | 0.589 *** horizontal<br>0.101 | 0.771 *** horizontal<br>0.114 |
| $SUMGDP\_AGR_{i,j,k}$ | + | -0.468 *** vertical<br>0.118 | -0.395 *** vertical<br>0.147 |
| $DISGDP_{i,j,k}$ | + | 0.152 horizontal<br>0.127 | -0.139 vertical<br>0.101 |
| $TCost_{j,k}$ | + | -0.031 vertical<br>0.021 | ~ ~<br>~ |
| $CONPRI_{i,k}$ | - | 0.029 ** vertical<br>0.014 | -0.018 horizontal<br>0.041 |
| $SKILLDIFF_{i,j}$ | +/- | 0.023 vertical<br>0.026 | -0.006 * horizontal<br>0.031 |
| $DISGDP_{i,j,k}$<br>$*SKILLDIFF_{i,j}$ | - | 0.003 vertical<br>0.095 | ~ ~<br>~ |
| $ER_{j,k}$ | + | ~ ~<br>~ | 0.095 **<br>0.048 |
| $InvestCost_{j,k}$ | - | -0.159 ***<br>0.031 | ~ ~<br>~ |
| $Tcost_{j,k-1}$ | +/- | ~ ~<br>~ | -0.107 *** vertical<br>0.022 |
| $FDI_{i,j,k-1}$ | + | 0.216 ***<br>0.026 | 0.411 ***<br>0.061 |

Significance level: '*' 10%, '**' 5%, '***' 1%

~ Variable not included in the estimation

| | | | |
|---|---|---|---|
| Observations | | 179 | 187 |
| $R^2$ | | 0.617 | 0.691 |
| Adjusted $R^2$ | | 0.596 | 0.676 |

It appears that most of the determinants follow the sign predicted. The majority of the determinants are significant at a 5 percent level for the Mediterranean countries. For both country groups, the market size ($GDP_{j,k}$) is positive and significant at a 1 percent level. The positive influence indicates horizontal FDI according to the knowledge-capital-model. The $SUMGDP\_AGR_{i,j,k}$ is negative at a 1 percent significance level for the Mediterranean and Mercosur host countries. This provided evidence for European MNEs also aiming to reduce production cost and seek efficiency in the agribusiness sector. According to [32], efficiency seeking appears if vertical FDI is undertaken. The same influence appears for the Mercosur countries although the variable is only significant at a 1 percent level. Similarity in the structure of the economy of the two countries ($DISGDP_{i,j,k}$) has a positive impact on FDI flows for the Mediterranean countries and a negative impact for

the Mercosur countries, but for both country groups this determinant is not significant.

Variables which hint at vertical FDI between the EU15 and the Mediterranean countries are trade cost of the host countries ($TCOST_{j,k}$) and the consumer price index of the home country ($CONPRI_{i,k}$). $TCOST_{j,k}$ shows a negative sign for the Mediterranean countries. Considering the deduction of [23] of the trade theory (with increasing trade costs trade flows decrease) FDI flows decrease in a complementary way. Furthermore, the impact of the consumer price index of the home country is positive at a 5 percent level pointing at the search for efficiency by MNE's in the case of the Mediterranean countries, meaning vertical FDI appears [33]. If the target of the home country is to seek new markets, the consumer prices should have a negative effect on the investment flows as for the Mercosur countries, although the coefficient is not significant.

Vertical FDI flows into the Mediterranean countries are furthermore underlined by the positive coefficients of $SKILLDIFF_{i,j}$ and $DISGDP_{i,j,k}$* $SKILLDIFF_{i,j}$. However, no robust evidence can be derived from these two determinants as they are not significant.

Contrary to the results for the Mediterranean countries, lagged trade cost impact European FDI flows into Mercosur countries at a 1 percent significance level. An increase in trade costs leads to a reduction of trade. A complementary relationship appears for trade and FDI flows if the latter also decreases if trade costs increase. The negative sign of the coefficient indicates vertical FDI.

The lagged FDI shows the estimated positive sign as predicted for both analyses and the impact is highly significant.

The coefficient of the exchange rate of the host countries ($ER_{j,k}$) is significant at a 5 percent level for the Mercosur countries showing that the cost for capital are relevant for European MNEs investing into the Mercosur countries [33]. For the Mediterranean countries, investment cost impact negatively and significantly at a 1 percent level. This finding is consistent with previous studies as high investment costs reduce the size of FDI flows.

The fit of the models is expressed through the R-squared and the adjusted R-squared. Both variables are high for the Mediterranean countries (with $R^2 = 0.987$ and the adjusted $R^2 = 0.986$) and the Mercosur countries (with $R^2 = 0.815$ and the adjusted $R^2 = 0,794$).

## VI. CONCLUSIONS

This paper offers a review of the relevant literature regarding determinants of FDIs and their relationship to trade in goods as well as an empirical analysis of the determinants of EU15 FDI flows in the food sector to Mediterranean and – to contrast results with the major host countries for European FDIs – also to Mercosur countries. The theory on FDI is developed widely, but is spread among international trade theory, the theory of the firm, and the theory of international capital markets. A unique theory does not yet exist. Furthermore, important aspects for the agricultural and food sector like, for example trade and investment barriers, have only recently been included and are not comprehensively treated yet. The empirical literature focuses on the general economy and results show substitutional and complementary relationships of FDI and trade in goods depending on the case study. Only few analyses exist on FDI and trade for the food sector and according to our knowledge none of those refer to the Euro-Mediterranean Partnership.

The analysis of Mediterranean countries as host countries reveals the significance of determinants indicating both, horizontal (market seeking) and vertical (efficiency oriented) investments, still with some more evidence for vertical type FDI. The same is generally true for the Mercosur countries, but with some more evidence for horizontal type FDI. For both country groups, the impact of the size of the host country market is positive and highly significant. FDI flows decrease, however, with the joint size of the agribusiness sector. Investment costs prove to be relevant only for the Mediterranean countries, whereas (lagged) trade cost significantly decrease FDI flows only to the Mercosur group. No significant influence of trade agreements on FDI flows could be detected.

Some additional determinants might have to be considered in future analyses, for example, distance or income tax rate. The mixed evidence on vertical and horizontal FDI between the EU15 and the Mediterranean countries leaves open if the overall relationship between FDI and trade is complementary (vertical) or substitutional (horizontal). In a further analysis, the joint determination of trade flows and FDI should be analysed.

In this first step of analysis the political influence is only included in a very general fashion by including an index for trade and investment costs as well as a dummy variable for the implementation of trade agreements. As political interventions like trade, investment and competition policy supposedly have an influence on FDI and are also addressed explicitly by the EMA, the inclusion of such political aspects in more depth should be carried out in further research. Specific impacts of different trade and investment barrier levels may then be inferred from such a refined analysis.

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