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**A TALE OF COMPETITION BETWEEN
EASTERN AND SOUTHERN EUROPE**

(RERUM CONCORDIA DISCORDS)

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A Tale of Competition between Eastern and Southern Europe (Rerum Concordia Discors)

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Abstract

This paper assesses the relationship between EU manufacturing imports from the southern EU and the CEEC. Final goods imports are strongly complementary and intermediate goods imports are substitutive. An increase in the high-skilled to low-skilled labor ratio in the EU-South or the degree of intra-EU multinationality lowers competition in intermediate goods trade between the EU-South and the CEEC.

Key words: Economic integration; Eastern enlargement

JEL classification: F14; F15

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1 Introduction¹

Previous research emphasizes the potential integration and welfare effects of both the (political and economic) opening-up of the Central and Eastern European countries (hereafter CEEC) and the enlargement of the EU by these economies (compare Hamilton & Winters, 1992; Baldwin, 1994; Baldwin et al., 1997; Keuschnigg & Kohler, 2001). It predominantly concentrates on a quantification of the possible overall trade and welfare gains for the EU (and also the CEEC). Starting point of the most studies dealing with trade and welfare effects of EU enlargement is the traditional framework of either perfect competition (*trade creation, trade diversion*) or imperfect competition (*pure profit effects, economies of scale effects, full market integration effects*).

This paper focuses on the question of whether EU imports from the CEEC² and from the southern EU countries³ (hereafter EU-South) are complementary (*concordia*) or substitutive (*discordia*). In order to get deeper insights, we additionally distinguish for the first time between final goods and intermediate goods imports in this context. We follow Winters' (1984) recommendation to take an Almost Ideal Demand System's (AIDS) perspective in the tradition of Deaton & Muellbauer (1980) and set up a well specified demand system for imports of EU regions. Of course, this only makes sense as far as final goods trade is considered. However, one arrives at

¹We should like to thank Jeff Bergstrand, Wilhelm Kohler and Michael Pfaffermayr for their helpful comments and Irene Langer for excellent assistance in the organization of the database.

²Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

³Greece, Portugal and Spain.

the same functional form when modelling intermediate goods import demand by a translog production function framework, which allows for non-constant returns to scale. We concentrate on manufacturing goods imports at the NACE 3-digit industry level and come up with a typology of the substitutive/complementary industries for intermediate goods imports. The next section briefly introduces the applied methodology. Section 3 presents the empirical findings, and section 4 concludes.

2 The AIDS Approach

The allocation of budget shares across different commodities is commonly analyzed following the AIDS framework put forward by Deaton & Muellbauer (1980). It has gained scope due to the increasing use of models for policy simulation and forecasting. We follow Cooper & McLaren (1992) and assume a PIGLOG class of preferences, from which a modified AIDS system (MAIDS) can be derived being able to overcome the well-known regularity-problem (i.e. "that under large changes in real incomes, budget shares can stray outside the [0,1] interval", Rimmer & Powell, 1996). The PIGLOG-specification of the expenditure function in AIDS reads

$$\log C(u, p) = (1 - u) \log a(p) + u \log b(p), \quad (1)$$

where $a(p)$ and $b(p)$ are positive and homogeneous of degree one functions of (a vector of) prices p and u is a given level of utility. This general expenditure function is transformed into the AIDS model by specifying $a(p)$ as a Translog function and $\log b(p)$ as a Cobb-Douglas function (Deaton & Muellbauer,

1980):

$$\log a(p) = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2} \sum_k \sum_j \gamma_{kj}^* \log p_k \log a(p) \quad (2)$$

$$\log b(p) = \log a(p) + \beta_0 \prod_k \log p_k^{b_k}. \quad (3)$$

To this expenditure function an indirect utility function exists, which can be derived by rearranging (2):

$$U(C, p) = \frac{\log(C/a)}{\log(b/a)}. \quad (4)$$

The budget shares of the single commodities are then obtained via Shephard's Lemma and Roy's Identity:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(C/P), \quad (5)$$

where w_i denotes the budget share of good i , p_j is the price of good j , C is total expenditure on all goods within the system, $\gamma_{ij} = \frac{1}{2}(\gamma_{ij}^* + \gamma_{ji}^*)$ and P is a price index for the whole group of expenditure shares with

$$\log P = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2} \sum_k \sum_j \gamma_{kj} \log p_k \log p_j. \quad (6)$$

Instead of this explicit formulation of the price index P stemming from the Translog part of AIDS, in empirical applications one usually applies the Stone price index as an approximation ($\log P^s = \sum w_i \log p_i$).

The restrictions of AIDS include additivity

$$\sum_{i=1}^n \alpha_i = 1, \quad \sum_{i=1}^n \gamma_{ij} = 0, \quad \sum_{i=1}^n \beta_i = 0, \quad (7)$$

homogeneity

$$\sum_{j=1}^n \gamma_{ij} = 0, \quad (8)$$

and symmetry

$$\gamma_{ij} = \gamma_{ji}. \quad (9)$$

According to the general specification of the AIDS model as stated above, we estimate a system of equations of final goods import shares by the EU countries (EU15 excluding Greece, Portugal and Spain; Belgium and Luxembourg are treated as a single economy) from EU-South, the 10 CEEC and the rest of the world (RoW) as three separate conglomerates of countries. This implicitly assumes that consumers allocate their budget in two nested stages. In a first stage, they decide how much domestic and foreign (imported) commodities are consumed, and in a second one they chose between different sources of foreign commodities. We concentrate on the second stage.

With respect to intermediate goods imports, we can follow the same procedure, but the translog import share equation is derived from a representative firm's cost minimization problem in two stages. In a first stage, firms decide to which extent inputs come from the home country (intra-national intermediate goods inputs) and to which extent from foreign economies (international outsourcing). In a second stage they chose between different potential suppliers of intermediate goods. Again, we concentrate on the second stage and allow for non-constant returns to scale. Due to homogeneity ($-\sum_j \gamma_{i,j-1} = \gamma_{ij}$), the j^{th} equation can be skipped and the prices are replaced by relative prices in the $n - 1$ equations.

In our case, it is sufficient to estimate only two equations (EU imports shares from EU-South and the CEEC), and pooling over the nine recipient EU countries (EU6 core plus Austria, Finland and Sweden) allows to estimate the cross-price elasticities from repeated observations. The remaining parameters are derived from the estimated ones. We estimate the two share equations as in (5) of each commodity via seemingly unrelated regression (SUR) methods.⁴

For our analysis, it is of special interest, whether EU imports from EU-South and the CEEC are complementary or substitutive. The required information is reflected by the sign of the cross-price elasticities of demand, which are derived in the following way ("−" indicates *complementarity* and "+" *substitution*). First, consider the general form of the (uncompensated) price elasticities of demand $\varepsilon_{ij} = \partial \log x_i / \partial \log p_j$ for the AIDS model (see Green & Alston, 1990):⁵

$$\varepsilon_{ij} = -\delta_{ij} + \left(\gamma_{ij} - \beta_{ij} \frac{\partial \log P}{\partial \log p_j} \right) / w_i, \quad (10)$$

where P is approximated by the Stone price index (P^s) and δ_{ij} is the Kronecker- δ ($\delta_{ij} = 1$ for $i = j$ and $\delta_{ij} = 0$ for $i \neq j$). Therefore,

$$\frac{\partial \log P}{\partial \log p_j} = w_j + \sum_k w_k \log P_k \frac{\partial \log w_k}{\partial \log p_j}. \quad (11)$$

One usually approximates this by omitting the second term in (11) (compare Edgerton, 1997), and obtains the uncompensated cross price elasticity

$$\varepsilon_{ij} = \frac{\gamma_{ij} - \beta_j w_j}{w_i} - \delta_{ij}. \quad (12)$$

⁴The results are available from the authors upon request.

⁵Since we are interested in the overall competition effect, we focus on the uncompensated rather than the compensated price elasticity.

3 Data and Empirical Results

In the empirical analysis, we use data from UNO on imports for each of the EU countries (altogether 11 countries, compare the previous section) from EU-South and the CEEC as two separate country groups between 1993 and 1998. Our data are pooled and vary across importing EU countries and time. Reliable import price variables are calculated on the basis of only these goods, where both import values and volumes are reported at the most disaggregated level. The trade data from SITC-5-digit are aggregated to Nace-3-digit (revision 1) using the available correspondence sheet. Additionally, final goods trade and intermediate goods trade are distinguished at the SITC-5-digit level following the correspondence sheet by Fontagné et al. (1996).⁶

In a second step, we focus on intermediate goods trade and a typology of the two industry classes (substitutive and complementary). We are interested in the potential influences on the cross-price elasticities in terms of four characteristics: the gross fixed capital formation as percent of gross production in the EU-South area (New Cronos, EUROSTAT), the unit labor costs in the EU-South (New Cronos, EUROSTAT), the high-skilled to low-skilled labor ratio in the EU-South (New Cronos, EUROSTAT), and the entropy index of multinational production within the EU (from Davies & Lyons, 1996, and Sleuwaegen & Veugelers, 2001).⁷ These characteristics represent prime

⁶We are indebted to Lionel Fontagné for kindly providing the correspondence sheet.

⁷A higher index of multinationality value indicates that (large) firms on the average produce in more countries (and are multinationals). We use averages over 1993-1998 for the industry characteristics except for the multinationality index. The latter is only available

candidates of important determinants of the expenditure shares which, in turn, are essential ingredients of the cross-price elasticity, compare (12).

We regress the shares of CEEC and EU-South on each NACE-3-digit manufacturing industry's (overall, final and intermediate goods) imports by the twelve remaining EU economies via SUR imposing the familiar restrictions (compare Winters, 1984, 1985, for a discussion) to obtain estimates of the respective cross-price elasticities between the EU-imports from the CEEC and the EU-South as in (12).

> Table 1 <

Table 1 presents the descriptive statistics of the estimated cross-price elasticities of interest for each import category (overall, final and intermediate goods).⁸ We can summarize the exercise and come up with the following results.

Results A: *On average, EU imports from the CEEC and the EU-South areas are substitutes. This fact is mainly driven by the dominance of intermediate goods trade (strong substitution; discordia) and not so by final goods imports (complementarity; concordia).*

The latter implies that the EU-South and the CEEC generally compete for "outsourcing" activities (in terms of intermediate goods imports as a broad measure) of the EU countries. In contrast, consumers in the EU view

⁸For the sake of brevity, we do not present the full results, which are available from the authors upon request. Of course, the EU import shares from both the CEEC and the EU-South are relatively small. Consequently, the cross-price elasticities in some industries are relatively high.

final goods from the EU-South and the CEEC as relatively dissimilar and complementary. However, one should mention that the distribution of final goods cross-price elasticities is skew. Nevertheless, the mean of the distribution is not due to a single industry "outlier". Noteworthy, most Nace 3-digit industries undertake both intermediate and final goods imports. Accordingly, the estimated final goods (5047 observations) and intermediate goods (5552 observations) import cross-price elasticities do not sum up to the "all goods" category (5934 observations). As easily can be seen from this table, the disaggregation by import category uncovers some interesting findings, which cannot be derived from an aggregate analysis.

In a second step, we focus only on intermediate goods trade and assess the typology of the estimated elasticities. More precisely, we run Kruskal-Wallis tests on the above mentioned four different industry characteristics and investigate, whether these characteristics are significantly different for the substitutive and the complementary industries, respectively.

> Table 2 <

Table 2 reports descriptive statistics of the (unweighted) average industry characteristics. Because of lacking data, these refer to the EU-South only.⁹ The average investment intensity in terms of gross production in the period 1993-1998 is about 6 percent in the average EU-South industry. One unit of real value added requires about 38 USD expenditures on wages in EU-South manufacturing. The average high-skilled to low-skilled labor ratio amounts

⁹This implicitly assumes that the observed changes in the EU-South variables also reflect changes as compared to the average competing CEEC industry.

to about 1.8, which implies a share of high-skilled workers of roughly 63 percent in active industry employment in the average EU-South manufacturing industry. Multinationality is measured by the entropy index¹⁰ and is about 0.64 on the average. Assuming symmetric plants and large firms, the latter implies that the average large EU enterprise is active in roughly two EU economies.

> Table 3 <

Table 3 reports Kruskal-Wallis test statistics. Under the null, complementary and substitutive industries are equivalent with respect to the industry characteristics under consideration. Bold superscript *C* (*S*) indicates, whether a higher value in the respective variable is associated with complementarity (substitution) between the EU-South and the CEEC in terms of EU intermediate goods imports from these regions. The Kruskal-Wallis test results can be summarized as follows.

Results B: *In industries, where the intermediate goods imports from the CEEC and the EU-South are substitutive, labor unit costs, the share of high-skilled workers or the degree of multinationality are lower than in the complementary ones.*

There are two remarks with respect to this second bloc of results. Goods imports from (and wages or jobs in) the EU-South are seriously affected in the industries, where intermediate goods production dominates and the educational attainment of the workers is low. Moreover, substitution in (intermediate) goods imports occurs in industries with a low degree of intra-EU

¹⁰ $\sum_i \pi_i \log(\pi_i)$, with π_i as the share of a firm's EU market production in location i .

multinationality. Unfortunately, no data are available on the activity of EU-based multinationals in the CEEC at the required disaggregated level. However, we know from anecdotal evidence at the individual firm and more aggregated data level that many multinationals are active in both areas.¹¹ Horizontal multinational activities might be dominant in both the EU-South and the CEEC. Moreover, given the possibility of a specialization across locations within multinational firms and in the two regions of interest, it seems plausible that relocation of activities per se is less important than specialization on specific activities at different locations. This analysis provides first insights into a typology of industries, but the analysis is univariate, and one should abstain from a rigorous, causal interpretation.

Finally, we assess the underlying determinants of the estimated cross-price elasticities along the lines of multivariate analysis. We estimate a bootstrapped simultaneous-quantile regression in order to properly account for the presence of outliers, which are mainly associated with industries with small import shares and therefore are of only minor interest. The last column in Table 3 reports the results for the median regression with 100 repetitions. To some extent, the results confirm our earlier findings and can be summarized as follows.

Results C: *In general, the substitution (competition) between the EU-South and the CEEC in terms of EU manufacturing intermediate goods imports increases with the unit labor costs in the EU-South. In contrast, it decreases with the share of high-skilled workers in the EU-South and the de-*

¹¹E.g. Volkswagen produces Seat in Spain and Skoda in the Czech Republic. More vertically organized multinationals are active in the textiles industries.

gree of multinationality in the EU.

In contrast to the univariate analysis above, the multivariate analysis assesses the marginal effects rather than the level (long-run) effects of the associated variables on the cross-price elasticities and allows a causal interpretation. The sign of the marginal change in the labor unit cost variable is different from its "level" counterpart. When controlling for the high-skilled to low-skilled labor ratio and the degree of multinationality, a (slightly) higher level of labor unit costs is associated with more competition between the EU-South and the CEEC (at least in the short-run). In general, EU intermediate goods imports from (and wages/jobs in) the EU-South are in danger through intermediate goods imports from the CEEC in such industries, where the share of high-skilled workers in the EU-South and/or the degree of intra-EU multinationality decreases.

We can summarize our findings in the following way. Intermediate goods imports are very important in overall manufacturing goods imports of the core and northern enlargement EU economies from the EU-South and the CEEC. Firms view intermediate goods from these two directions as relatively similar. This results in a strong substitution, which is (inter alia) driven by the growth of unit labor costs in industries in the EU-South, where intermediate goods production is important.

4 Conclusions

This paper analyzes the competition between Central and Eastern Europe and the southern EU economies in terms of cross-price elasticities in EU man-

ufacturing industry imports. At the NACE-3-digit level, we come up with the following findings. First, it seems natural and necessary to distinguish between final and intermediate goods imports, since the former are affected by consumer preferences and the latter by the firms' requirements (costs, technologies) in the production process of final goods. There is *concordia discors* final goods imports are complementary and intermediate goods imports are substitutive, on the average. In sum, substitution dominates. Second, intermediate goods imports are complementary, where the unit labor costs in the EU-South, the high-skilled to low-skilled labor ratio in the EU-South or the degree of intra-EU multinationality is high. Third, a *marginal increase* in the EU-South's unit labor costs increases substitution between the EU-South and the CEEC. In contrast, an increase in the high-skilled to low-skilled labor ratio in the EU-South or the degree of intra-EU multinationality mitigates competition between the EU-South and the CEEC. This implicitly suggests that multinational firms in these two regions are either horizontally organized and the two locations are not competing for affiliates or they are vertically organized but regions are less competing for affiliates per se than for specific activities of the firms at the locations. Hence, the two regions of interest seem not to compete in terms of a possible relocation of plants within multinational firms.

In sum, the overall substitution of goods imports from the EU-South to the CEEC is due to intermediate goods imports. An increase in the unit labor costs in the EU-South in industries with a fairly large share of intermediate goods production enforces the substitution of goods imports between the EU-South and the CEEC.

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*Table 1: Descriptive Statistics of Estimated Cross-Price Elasticities
EU-Imports from CEEC and EU-South*

Statistics	All goods	Final goods	Intermediate goods
Mean	0.49	-5.78	2.19
Median	0.23	0.11	0.19
Standard error	1.28	64.33	26.3
Number of estimated elasticities	5934	5047	5552
% of which >0 (substitution)	95	71	90
% of which <0 (complementarity)	5	29	10

Table 2: Descriptive Statistics of Industry Characteristics

Characteristics ^{a)}	Mean	Std. error	Number of industries
Investment intensity in EU-South ^{b)}	6.41	2.20	70
Unit labor costs in EU-South ^{c)}	37.70	16.26	69
High-skilled to low-skilled labor ratio in EU-South ^{d)}	1.73	1.02	69
EU-market multinationality ^{e)}	0.64	0.13	64

a) Underlying data are averages over the period 1993-1997. - b) Gross fixed capital formation as percent of gross production in the EU-South. - c) Wages per unit of value added in the EU-South (base year is 1996). - d) Workers with at least secondary educational attainment in relation to workers with less than secondary educational attainment in the EU-South; imputed from NACE-2-digit data. - e) Entropy index of multinational production within the EU (from Sleuwaegen & Veugelers, 2001).

Table 3: Are Substitutive and Complementary Industries Different? A Typology of Industries (Intermediate Goods Trade Only)

Characteristics	Kruskal-Wallis tests ^{a)}	Median regression ^{b)}
Investment intensity in EU-South ^{c)}	0.083 (0.773)	0.297 (0.271)
Unit labor costs in EU-South ^{d)}	155.422 *** (0.000) C	0.003 *** (0.000) S
High-skilled to low-skilled labor ratio in EU-South ^{e)}	141.903 *** (0.000) C	-0.020 *** (0.005) C
EU-market multinationality ^{f)}	501.668 *** (0.000) C	-0.166 *** (0.042) C

a) Reported statistics are Kruskal-Wallis χ^2 tests for the equality of populations (complementarity versus substitution between EU imports from the CEEC and EU-South) with one degree of freedom. P-values in parentheses. - b) Bootstrapped simultaneous-quantile regression. Reported coefficients are due to the 50% quantile. Standard errors in parentheses. - c) Gross fixed capital formation as percent of gross production in the EU-South. - d) Wages per unit of output in the EU-South (base year is 1996). - e) Workers with at least secondary educational attainment in relation to workers with at less than secondary educational attainment in the EU-South; imputed from NACE-2-digit data. - f) Entropy index of multinational production within the EU (from Sleuwaegen & Veugelers, 2001).

Bold superscript "S" ("C") denotes substitution (complementarity). ***) significant at 1%.

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