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EU Enlargement Implications on the New Member States Agri-food Trade

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Abstract — In the paper dynamic gravity models are estimated for the agricultural trade of six new EU Member States (the Czech Republic, Latvia, Lithuania, Romania, Slovakia, and Slovenia) with selected countries and trade groupings between 1996 and 2005. In general, we find low income elasticities and high price elasticities of import demand for agricultural commodities. The lagged values for trade were highly significant. The accession to the EU increased the new Member States' exports, but had less impact on their imports. The new Member States have gained significantly from liberalized access to the EU agri-food market.

Keywords — Agricultural trade, EU enlargement, dynamic panel data models

I. INTRODUCTION

The Central and Eastern European countries (CEECs) received preferential trade treatment even before accession to the European Union (EU) as a result of bilateral agreements (especially Europe Agreements) with the EU. However, the extent of liberalization of agricultural trade in these agreements was limited. The asymmetric preferences granted by association agreements – preferential quotas for the CEECs – did not expand these countries' exports to the EU as expected. By contrast, exports of agricultural and food commodities from the EU-15 to the CEECs increased. As further factors in the CEECs' low performance in agricultural exports, [1] pointed to the unsatisfactory quality of exports, insufficient sanitary and phytosanitary arrangements, an uncompetitive food processing industry, insufficient marketing, and the revaluation of the real exchange rate of individual CEEC currencies against the

German mark. Other serious barriers to CEEC exports to the EU, according to the authors, were the way in which the Commission issued import licenses under preferential quotas, the lack of transparency of quota utilization, and the distribution of market power, which probably conferred preferential advantages on importers [2]. In turn, [3] argues that the CEECs have achieved a considerable success in the implementation of agricultural reforms.

The Eastern enlargement of the EU has completely changed these conditions. All new Member States have gained full access to the common market in agricultural commodities. Under these conditions, the distortions in the agricultural market should be replaced by efficient allocation of resources. However, the outcome of this development is difficult to assess on the basis of previous developments. In particular, the previous weaknesses of the agricultural sector in the CEECs have raised the question whether their agricultural products are competitive enough to gain from the liberalization of trade in agricultural commodities [4]. Our early results for the Eastern enlargement of the EU reject this hypothesis. The new Member States have been able to utilize the advantage of the access to the single market of the EU.

In the paper we analyze Czech, Latvian, Lithuanian, Romanian, Slovak, and Slovene imports and exports of selected agricultural commodities with selected countries and regions between 1996 and 2005. Moreover, the coverage of our study is broader because the partner countries analyzed in the study include the EU-15, ten new Member States (that is, including Romania and Bulgaria), the Commonwealth of Independent States (CIS), the USA and the rest of world (ROW).

We show that dynamic panel data models are appropriate tool for modelling agricultural trade flows. Past levels of the agricultural trade are a significant determinant of the current trade level, which underlines the importance of history in this market. In general, we found low income but high price elasticities of demand for agricultural imports. The agricultural markets have been already saturated and they are highly sensitive to price changes.

II. MATERIALS AND METHODS

A. Data Description

The data used in this study were collected under the TRADEAG FP6 project (TRADEAG CEEC data base) from the national statistical offices. Data base includes bilateral agricultural trade flows of the Czech Republic, Latvia, Lithuania, Romania, Slovakia, and Slovenia with the EU-15, the new Member States (Bulgaria, Czech Republic, Poland, Hungary, Latvia, Lithuania, Estonia, Romania, Slovakia, Slovenia), the Commonwealth of Independent States as a whole (CIS), the USA, and the rest of the world (all other countries).

Quarterly data (1996-2005) for exports and imports of the following agricultural commodities: Meat of bovine animals (HS 0201-0202), Meat of swine (HS 0203), Meat of poultry (HS 0207), Meat total (HS 0201-0210), Milk and cream (HS 0401-0402), Cheese and curd (HS 0406), Milk and dairy total (HS 0401-0406), Cereals other than rice (HS 1001-1005+1007-1008), Oilseeds (HS 1201-1207), Sugar (HS 1701-1702), and, finally, total agricultural imports and exports were used. All trade flows were available both in nominal value (EUR or national currencies) and physical units (kilograms). This allowed computing trade prices and terms of trade for all commodities and partner countries.

The data set for the reporting countries also includes annual trade flow data for Hungary, Estonia, and Poland, for which quarterly data were not available. Nevertheless, we used these data to compare the overall development, which shows that the pattern for these three countries does not deviate significantly from the pattern of countries for which quarterly data was available.

In addition, income data for the individual reporting and partner countries were used. The time series for gross domestic product (GDP) was subject to seasonal influence, so seasonally adjusted data using the US Census Bureau's X12 ARIMA procedure were applied. In the sensitivity analysis, we also controlled for outliers. Following [5], all observations that deviated by more than a specific margin from the long-term trend were left out. Since the results did not change, we present only non-adjusted results here.

B. Dynamic Panel Gravity Models

In general, two approaches dominate applied trade analysis. First, aggregate or more or less disaggregate trade flows of individual countries are related to income from export markets and price (competitiveness). [6] presented a computable general equilibrium model (CGEM) analyzing the Eastern enlargement of the EU. The advantage of the CGEM approach is that it includes relatively detailed sectoral information for the economies analyzed. Except in a few models of the world economy e.g. [7], foreign trade development enters the model as a set of assumptions. With the exception of few studies [8]), however, the focus is usually put on manufacturing industries, while agriculture is a part of the numeraire sector. In turn, selected aspects of the agricultural policies, e.g. the Common Agricultural Policy, on various sectors of the economy are often modeled by this approach [9].

Second, gravity models are often used to estimate trade flows for several countries in a specific period as a function of supply and demand in partner countries, transport and transaction costs and integration effects (e.g. membership of the EU). These models were used in analyses of Eastern European countries' trade. [10] and [11] presented the first applications of this approach. [12] reviewed the literature and analyzed the accession of the new Member States to the EU. In fact, the CGEM use often the results of gravity models as inputs on the external developments.

The disadvantage of gravity models, however, is that while the geographic structure is usually detailed (with a high number of reporting and partner countries) the trade flows analyzed are only aggregates of all commodities. Thus, these analyses do not provide information on integration effects by

economic sector. Nevertheless, some authors also use these models to analyze the effects of integration in selected sectors, usually using a shorter cross-country dimension. [13] and [14] use gravity models for sensitive commodities including several agricultural products. [15] estimates gravity models for the agricultural trade.

Reflecting the properties of data set available, we combined both approaches used in the literature. We considered both country and product-specific variables and overall macroeconomic data in the estimations. Following the standard demand equation, overall income and relative prices (product price related to the overall price level) were considered as the major determinants of trade in specific commodities with selected countries. Because we had only short time series, we the cross-sectional dimension was used, which was, however, smaller than in typical gravity models. This approach can be expressed as

$$m_{it} = \alpha_i + \theta_t + \rho m_{it-1} + \beta_1 y_t^{home} - \beta_2 (e_t p_{it}^m - cpi_{it}^{home}) + \gamma EU + \varepsilon_{it}^m \quad (1)$$

$$x_{it} = \alpha_i + \theta_t + \rho x_{it-1} + \beta_1 y_{it} - \beta_2 (p_{it}^x - cpi_{it}) + \gamma EU + \varepsilon_{it}^x \quad (2)$$

where α denotes fixed effects, θ time effects, m import and x export of a particular commodity for countries i at the time t , y denotes income – GDP in home country (y_{home}) and in partner countries (y_i), p denotes the price of a product – calculated by dividing agricultural trade (by value in EUR) by the quantity in kg, e stands for the exchange rate (home currency per EUR 1), and cpi denotes the consumer price index either in the home or in the partner countries.

Furthermore, seasonal variables (*seas2*, *seas3*, *seas4*) and a dummy variable for membership of the EU (which equals 1 if the both reporting and partner countries are member states of the EU and 0 otherwise) were included. In the data set, this variable mainly shows the effects of the EU enlargement in May 2004.

Thus, the model stated by equations (1) and (2) is a dynamic version of gravity models, where the domestic supply factors are fully covered by the time effects θ . In addition, this model includes the elements of a standard demand function (relative price effects).

The comparison of effects for particular agricultural commodities is also a new contribution to trade models. We present the estimates for ten broad agricultural commodities and for the aggregate of the agricultural trade.

Equations (1) and (2) present a model with fixed effects α_i , which we use as our basic specification. The least square method of model estimation can be biased, because fixed effects, which are part of the dependent variable (m_{it} and x_{it}), and of the lagged dependent variable (m_{it-1} and x_{it-1}) on the right side of the equation, cause autocorrelation of the dependent variable. [16] finds that bias is strong if the cross-sectional dimension (number of countries) is relatively high and the time dimension (number of observations for individual countries) is low. Because in our database the cross-sectional dimension is relatively small (11 countries or groups) and the time dimension is relatively long (40 observations), the bias range should be limited.

The inclusion of dynamic effects in trade flows is discussed by [17]. The dynamic effects allow us to distinguish between short-run and long-run integration effects. The structure of the autoregressive part of the model was selected on the basis of information criteria (Akaike information criterion). In most models the optimal lag structure includes only one lag. To make the estimations comparable, we present the first-order autoregressive model for all commodities.

III. RESULTS

Few export commodities from the new Member States actually depend on the income development of their trading partners, which implies that the developed import markets are already saturated. The GDP of the importing country is a significant determinant only for poultry, cheese, and sugar exports. The latter two commodities possibly have a luxury component, which is then consistent with the other results. Somewhat surprisingly, exports of milk and cream depend negatively on income. On the one hand, this may denote a consumer preference in the wealthier countries for light (low-fat) milk products. On the other hand, it may also denote non-tariff barriers and preferences for local products in the relatively wealthy countries.

Relative price level is an important determinant of exports of nearly all agricultural commodities from the new Member States. Examples are cereals and meat products in general. The trade pattern for cereals may be possibly explained by the homogeneity of the products traded. Thus, prices may be an indication of different product quality, and may not enter the demand function directly. The trade pattern for meat products may be a result of various factors, including BSE effects and the recent trend towards fresh and local products. For other products, price elasticities are relatively large, ranging between one half and three quarters.

The agricultural exports are significantly influenced by past export performance. The autoregressive coefficients are usually between 0.3 and 0.6. Finally, we can see that membership of the EU has large and positive effects on the majority of export commodities. The estimated coefficients are between 0.5 (poultry) and 1.3 (sugar). After we reflect that the estimation equation is defined in logs,¹ we get EU effects of between 60% and 200%.

Furthermore, the long-run effects are much larger because we also have to reflect the autoregressive parameter.² On average, they are higher by a factor of 1.5, but some commodities, especially those with already high short-run effects (sugar) increase by three times the short-run effects.

We also report the results for total agricultural exports. These results however, are subject to possible aggregation bias, given the large differences between the parameters estimated for individual agricultural commodities. Nevertheless, we can see that income elasticity is low but significant on average, while price elasticities remain relatively large. The EU effects are again large and statistically significant for the individual agro-food commodities.

The core part of demand for agricultural imports in the new Member States behaves slightly differently from that for agricultural exports. Income elasticities are significant only for a few products. However, it seems that mainly meat and milk products depend heavily on income development in these countries.

1. The EU effects are computed as $\exp(\gamma)$.

2. We obtain the long-run effects from the sum of a geometric row, $\gamma/(1-\rho)$. This expression is then transformed, exactly as for the short-run effects, in order to discuss their absolute size.

Similarly, price elasticities are larger (up to 1.4 for sugar) than those found on the export side. Price elasticities for meat products are again insignificant, but those for cereals are large now. By contrast, the autoregressive parameters are of similar size to those estimated for exports.

Finally, the EU effects on imports are substantially different. We can see that only imports of sensitive products (milk products, oilseeds, and sugar) show significant EU effects, which are only slightly larger than those on the export side. This means that with the exception of sugar and oilseeds, the Eastern enlargement of the EU has largely had positive effects on the new Member States with positive net effects. While the effects are opposite to expectations before the enlargement, our findings confirm the first results on the EU accession effects on the agricultural sector in the new Member States by e.g. [18]. However, the effects remain moderate.

Our analysis could be significantly biased by important country-specific effects. Therefore, we estimate all specifications for the individual reporting countries. While we can find some slight differences between these results, the overall picture remains the same.³

IV. CONCLUSIONS

In May 2004 and January 2007, ten countries in Central and Eastern Europe joined the EU and thus gained full access to the single market. This has also liberalized trade in sensitive products. The effects on the agricultural trade had been a particular source of concern for policy makers and agricultural producers because of wage and land cost differentials [19]. The productivity of agricultural enterprises, however, has remained low during the economic reforms, because this sector did not enjoy budget transfers similar to those available in the EU.

We analyze trade flows of agricultural commodities between selected countries (the Czech Republic, Latvia, Lithuania, Romania, Slovakia, and Slovenia) and a broad group of trading partners (the EU-15, the new Member States in Central and Eastern Europe, the CIS, the USA and the rest of the world). Our analysis

3. The detailed country results are available upon request from authors.

does not directly include Hungary or Poland for data reasons.

Despite the many limitations of our analysis, our results show slightly positive implications for the new Member States. In general, the effects of EU accession are higher on exports from the new Member States than on their imports. This contradicts the fears which were often stated before the enlargement of the EU. Nevertheless, the gains remain moderate in the long run. Given the potential of the new Member States, their exports could increase. However, the net effects (exports less imports) are much smaller, especially in the commodities analysed.

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