Analysing Competitiveness of the Hungarian Agro-Food Chains

Istvan Feher
ifeher@mail.datanet.hu

Zsolt Papp

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ANALYSING COMPETITIVENESS OF THE HUNGARIAN AGRO-FOOD CHAINS

István Fehér PhD and Zsolt Papp PhD
ifeher@mail.datanet.hu

Abstract

Based on the Policy Analysis Matrix (PAM) approach this paper provides an assessment of the competitive position of the Hungarian agro-food industry in view of EU integration. The situation in the food processing sector is assessed with the use of actual cost data from representative Hungarian companies. The paper presents an assessment of the current situation prior to EU integration as well as a future outlook under various scenarios with regard to the expected policy environment and the rate of technological change.

The actual measurement of competitiveness in this study focuses mainly on Private Resource Cost (PRC) which indicates competitiveness under real market conditions and Domestic Resource Cost (DRC) which gives an assessment on the social or economic efficiency of an activity, i.e. whether domestic resources are really used efficiently in current production.
In the food processing sector 21 different food products have been investigated which fall into four industries: meat, poultry, dairy, and fruits and vegetables. Under current conditions only some products are competitive in private terms. The situation would improve after EU integration especially for poultry, fruits and vegetables, because agricultural policy conditions are more favourable under the CAP. If additional FDI(Foreign Direct Investments) would flow into the country after EU membership, this would boost profitability.

As far as DRC values are concerned, it must be stated that only some of the production activities are clearly efficient. Dairy, fruits and vegetables, and roast goose production show relatively weak social competitiveness, while other poultry and fruit and vegetables products are more favourable from the economic point of view. As EU policies provide on average higher protection levels, the competitiveness of Hungarian food processing on world markets would deteriorate for most products after EU accession. However, these effects can be offset by additional technological change due to FDI inflows or otherwise induced technological progress.
Keywords: competitiveness, strategy, accession, technology development, investment

1. Introduction

This paper provides the results of the competitiveness analysis using the so-called Policy Analysis Matrix (PAM) approach. This modeling effort aims at identifying constraints to and opportunities for investments in Hungarian agriculture and agribusiness in view of the upcoming EU accession of the country. It is structured as follows: First, the approach chosen will be described; in point two of the paper the concept of modeling the Hungarian agro-food chain with a PAM will be described, the main indicators for measuring competitiveness after having organized a PAM – Domestic Resource Costs (DRC) and Private Resource Costs (PRC) – will be explained, and the data and information used as well as the underlying assumptions for the analysis will be reflected.
The results are described in the paper based on own calculations of DRC and PRC values will be provided for the current situation as well as for two different EU accession scenarios: with and without additional technology adoption through Foreign Direct Investments (FDI) or otherwise induced technological progress. In total, six different DRC and PRC values will be calculated which allow for a detailed assessment of potential competitiveness of the Hungarian Agro-food business.

Based on the results of the PAM modeling and calculation, recommendations, which are considered as important for developing sector strategy. The recommendations will point at the policy dimension of creating and supporting competitiveness.

2. Approach

The main objective of the paper is to measure and forecast the competitive position of the Hungarian agro-food sector before and after an EU accession. Measuring competitiveness is not an easy task in itself as a variety of concepts has emerged from economic research. There is no single measure of competitiveness which economists have agreed upon, which is mainly due to the fact that competitiveness can be defined at various levels, i.e. the single firm, sector or industry, or whole countries. In the present analysis we will focus at typical firms representing various sub-sectors of the different agro-food chain in Hungary.

2.1. The Policy Analysis Matrix Approach

For this type of analysis the Policy Analysis Matrix (PAM) approach seems most appropriate. It sets up an organizational framework that may be used to represent the effects of different policy scenarios on single firms or sectors.[1] The PAM has several advantages compared to other methods:

- data requirements are rather limited and flexible which is an important issue in transition countries
- the structure of the analysis is rather simple and transparent and, hence, results can be easily transferred to policy-makers who may not be familiar with more complex economic concepts and models
- several well-known indicators emerge from the analysis, providing a starting point for comparisons over time, across sectors or countries.

The PAM approach takes two different perspectives with regard to these questions into account:
Private profitability: "Is this activity profitable from the point of view of the single firm? Are food processing firms competitive compared to other sectors, in the domestic market as well as in the enlarged EU market in the future?"

Social profitability: "Does this activity provide a gain to the domestic economy, i.e. are local resources used efficiently? Or does it draw resources from other sectors which would be better used elsewhere in the economy? Is Hungarian food processing competitive at world market conditions, or would Hungary be better off by importing the same food products from third countries?"

The PAM provides an analytical way to measure empirically private and social profitability and the effects of different policies. It presents a system of double-entry book-keeping and is based on a simple accounting identity: Profit = Revenue – Costs

In order to construct a PAM, costs in this relationship are further broken down into tradable inputs and non-tradable inputs (which are also called "domestic factors"). Revenues, costs, and profits are then calculated using two sets of prices:

Financial (or private) prices: these are the prices which private agents actually face in the market.

Economic (or social) prices: these prices are designed to measure the opportunity cost to the economy of using a resource or domestic factor.

The difference between private and social prices reflects the size of transfers which are either fed in or taken out of the system by all kinds of government intervention and market distortions. The general structure of the PAM is shown in Table 1. All values are expressed per unit of output.

Table 1: Policy analysis matrix (example)

[1] For a detailed description and explanation see MONKE AND PEARSON (1989).

	Revenues	Tradable input costs	Domestic factor costs	Profits
Financial prices (private)	A 328432	B 72090	C 253343	D= A-B-C 2999
Economic prices (social)	E 285736	F 65559	G 227218	H= E-F-G -7041
Policy transfers	I = A-E 42696	J =F-B -6531	K = G-C -26125	L= I+J+K 10004

The PAM gives three absolute measures which can be defined by the sum of various cells of the matrix:

Private profitability (D = A-B-C): this represents the net income of firms when revenues and inputs are evaluated at actual market prices. All relevant subsidies and protective measures are included in these values. A "zero" private profit means that domestic factors like land, labor and capital receive normal returns. A non-negative value, as shown in the example in Table 1, indicates that a firm is competitive under the market conditions it faces.

Social profitability (H = E-F-G): this illustrates the benefit to the economy from producing the given food product. The revenues and costs are evaluated at social prices (or opportunity costs). First, the value added is recalculated at border prices, which indicates the net earnings (or net savings) of foreign exchange. Second, domestic factors are measured in terms of alternatives foregone. "Zero" social profit means that the activity is only just efficient in terms of its foreign exchange earning capacity. A negative value, as shown in the example in Table 1, indicates that the activity is non-competitive under world market conditions and that domestic factors are not used efficiently in this sector.

Net transfers (L = I+J+K): this is an overall measure of the extent of government intervention under the assumption that no other market imperfections exist. It can be derived by taking the total revenue transfer and deducting both the tradable input transfers and the domestic factor transfers. Alternatively, it can also be expressed by deducting social profit from private profit. A positive value, as shown in the example in Table 1, indicates that transfers are flowing from other sectors of the economy into the activity under consideration.

2.2. Indicators of Competitiveness

In order to make results from the PAM comparable between firms and sectors and over time, the absolute measures can be normalized and represented by various indicators. For the analysis in this paper we will focus on three indicators: the Nominal protection coefficient (NPC), the Domestic resource cost (DRC), and the Private resource cost (PRC). Again, these indicators can be derived by combining several cells from the PAM (Table 2).

Table 2: Competitiveness indicators derived from the PAM (example)

Nominal protection coefficient	NPC	[A/E]-1	0.15
Domestic resource cost	**DRC**	G/(E-F)	1.03
Private resource cost	**PRC**	C/(A-B)	0.99

Nominal protection coefficient: this measure can be interpreted as the rate by which the output

evaluated at financial (or private) prices exceeds (if >0) or is below (if <0) the opportunity cost of the good taken at its border price. In calculating the NPC only output prices are considered. In the example (Table 2) the current NPC means that the value of private revenues exceeds social revenues by 15%.

Domestic resource cost: this measure represents social profitability, i.e. it reflects the ratio by which the social (or economic) value of domestic factors used in production exceeds (if >1) or is below (if <1) the value added at social (or world market) prices. If DRC < 1, the opportunity cost of non-tradable, domestic inputs is smaller than the amount of foreign exchange which would have to be paid if the good were purchased from abroad. Or, in other words, the activity is efficient in economic terms and competitive under world market conditions. If DRC > 1, as given in the example in Table 2, from an efficiency standpoint it would be better to import the good instead of using domestic resources for producing it within the country. In this case production would be non-competitive in the world market.

Private resource cost: this measure has the same elements as the DRC, but with all values expressed in private rather than social prices. If PRC < 1, the activity under consideration is profitable and uses domestic resources more efficiently than other sectors within the economy. There is a private incentive to expand this kind of production. If PRC > 1, the activity is not profitable and should be reduced or even discontinued in the medium term. PRC and DRC results may lead in different directions, especially if strong policy interventions are observed, like in many agricultural and food markets. It may well be the case, as in the example in Table 1 and 2, that a certain activity is profitable in private terms (PRC <1), but inefficient and non-competitive under world market conditions (DRC >1). In this case, looking only at profitability figures provided by private companies may be misleading, if the overall position of the sector has to be judged from the policy-maker's point of view.

2.3. Data sources:

With the tools and measures outlined so far we can, on the one hand, analyse the current situation using data that can be directly observed in the Hungarian agro-food chain. Furthermore, by simulating a price and policy structure which is likely to prevail after an EU accession we are able to come up with future scenarios and compare it with the status quo. Changes in technology can also be analysed by changing the amount of inputs used per unit of output.

Three sets of basic data are needed for the analysis: a current detailed cost structure of the firms and sectors to be investigated; a description and measures of currently relevant policy interventions in Hungary; a description of the policy framework and price structure prevailing in the EU at the time of accession.Detailed cost data on 21 products of the Hungarian food processing industry were collected. The products fall into 4 sub-sectors: meat processing, poultry processing, dairy production, and fruits and vegetables. An example of such a detailed cost table is given in Table 3.

Table 3: Example of a detailed cost sheet for Hungary (Ft per ton of output)

	Pork, bone in		
Items	**1997**	**1998**	**1999**
Cost of materials	292487	301936	261121
Auxiliary material cost	7	9	13
Packaging	28	19	-
Direct energy cost	1083	2113	2472
Other direct material cost	-	15	59
Direct material cost	293605	304092	263665
Labor costs	2392	3488	3837
Social insurance	1048	1363	1499

Other direct cost	911	1112	2032
Direct cost, total	297956	310055	271033
Indirect cost	15605	17452	20419
Total cost	313561	327507	291452
Profit	28340	-10405	-3965
Producer price (sales price)	341901	317102	287487

The selected and available data are representing typical firms within the industry which provide a realistic picture of the general situation. Of course, it has to be taken into consideration that there are always significant deviations between more or less efficient firms in the same industry. To get a more complete picture, the present analysis could be supplemented by a PAM analysis based sector-wide input-output tables.

Cost data were made available for three years in a row. For the actual analysis and calculations the average values for 1997-99 were used, in order to avoid extreme outcomes for specific years. It would have been desirable to have the single cost items split into prices and quantities, but these data were currently not available.

Information on current policy interventions were more difficult to collect. As this information was not supplied, indicators on price distortions in Hungarian agricultural and food markets as well as for the EU had to be taken from international statistics and publications. The major source was OECD (2000). Instead of applying detailed policy measures for selected cost items, appropriate summary indicators were taken from the OECD publication.

In the case of the food processing industry it is rather difficult to distinguish policy interventions which only affect processed food products from those affecting agricultural raw materials. In some cases, like tariffs or other border interventions, only processed food products are directly affected by the distortion. However, part of the price effects at the processing level will be passed on to the primary producer who delivers raw material inputs to the processing industry. In other cases, like government intervention purchases, prices of agricultural raw products are directly affected by the policy, but it need not necessarily have an impact on the processed level. This problem would not arise, if the agro-food sector would be analyzed as one single industry. But in this case the focus is on the processing sector, where we have agricultural products as major inputs and processed products as outputs. Hence, it is important to distinguish between policy effects on the input and on the output side.

As simplification of the problem two measures provided by the OECD were taken as the best available proxies for measuring agricultural policy effects, the Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE).

Definition of PSE: this is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at the farm- gate level, arising from policy measures that support agriculture. The main part of the total support in Hungary and the EU currently consists of market price support. The PSE can be calculated for specific commodities and is usually expressed in percentage terms. A positive value of 10% means that the private value of agricultural output is 10% higher than the same output evaluated without all policy-related transfers. To put it differently, to derive the "social" value of raw material inputs, the actually observed "private" value has been reduced by the percentage PSE.

Definition of CSE: this is an indicator of the annual monetary value of gross transfers from (or to) consumers of agricultural commodities, measured at the farm-gate level, arising from policy measures which support agriculture. Again, most agricultural policies currently imply a transfer from consumers to producers through market price distortions. The CSE can also be expressed in commodity-specific percentage terms. A negative value of –10% means, that the value of consumption would be 10% lower if all policy distortions would be taken away. Hence, in order to derive "social" values of

processed food products, the actually observed "private" values have been reduced by the percentage CSE.[2]

The use of PSEs and CSEs for measuring agricultural policy distortions in the PAM is certainly only an approximation. However, it is derived in a consistent way which is also comparable between countries. This is an important advantage and a precondition for analysing EU accession scenarios.

To give an overview of current protection levels in Hungary and the EU, percentage PSEs and CSEs are provided in Table 4. For the Fruits and Vegetables sector no estimates were available, therefore currently applied tariff rates were taken instead.

Table 4: Measures of policy distortions in Hungary and the EU (Percent, 1997-99)

	Hungary		EU	
	PSE	**CSE**	**PSE**	**CSE**
Pork	-1	14	11	-13
Beef	10	7	58	-46
Poultry	33	-22	23	-25
Milk	48	-41	54	-53

3. Assessing Competitiveness of Food Processing in Hungary: Own Calculations

The analysis of the competitive situation of Hungarian food processing industries is based on the data described in earlier. Using the detailed cost data and additional information on policy interventions from the literature, a policy analysis matrix has been constructed for each of the 21 products to be investigated. Results for NPC, PRC and DRC were then collected in one table for each scenario, in order to provide a quick cross-comparison for the interpretation.
The following three scenarios have been analyzed:

Base scenario (HU): the base scenario describes the average situation in Hungary in the years 1997-99. It was decided not to focus on a single year, because the cost data indicated quite significant volatility between years. This would have made it rather difficult to come up with a meaningful comparison between products and scenarios.

Scenario EU Accession (EU): in this scenario the current price structure and the relevant policy measures in the EU have been transferred to the Hungarian situation. This is to say that there is no immediate technology change, only the price and market conditions change which are faced by Hungarian producers. Estimates on market price changes for raw materials, processed products, and other inputs in Hungary after EU accession were taken from FULLER ET AL. (2000). Measures of policy distortions (PSE, CSE) were found in OECD (2000).

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[2] In contrast to the PSE concept, a specific problem arises on the consumer side in the context of this study. Originally, CSE values are calculated at the farm-gate level, although here they are used to calculate "social" values of food processing outputs. This simplification can be justified by the assumption that the major impact of political price effects on the processed level will be passed on down to the raw material input level. E.g. if an import tariff on a processed food product increases the domestic price by 20%, we will assume that the domestic price for the relevant raw material input will be increased by the same amount. Generally, it is very difficult to estimate how much of any price change in the wholesale or retail market is passed on through the processing industry to agricultural producers. This would be subject to a more comprehensive study.

Scenario EU Accession with FDI (EU_FDI): in this scenario all policy and price conditions are the same as in the previous scenario. Additionally it was assumed that, due to more stable economic conditions and an improved institutional setting after EU accession, additional FDI will be induced in Hungary. This may lead to more efficient use of raw materials, labor and energy. The overall technology effect was estimated to be 20% compared to the current situation. That is to say, for the same amount of output, the inputs of raw materials, labor and energy is reduced by 20%. This will certainly not occur at once after EU membership, but can be seen as a medium-term scenario. In any case, it has been shown in other studies that the effects of improved technologies on competitiveness should not be neglected.

For simplification, no accession or transition period to full membership was taken into account in either scenario. Hungary was rather assumed to enter the EU at once. This can be justified by the fact, that otherwise we would have had to estimate likely changes in the EU up to the date of accession, which are uncertain in itself. The policy focus in the accession scenarios is on agricultural and food policy measures. It is assumed that these are the major distortions affecting agro-business in Hungary and the EU at the moment. Given the resources and the limited data base for this study, it was not possible to consider other distortions which might occur only in the food processing industry.

Table 5 shows the outcome for the base scenario. The NPC figures indicate that there is a very high protection level for dairy products (72%) and a relatively high level for poultry and fruits & vegetables. On the other hand, pork and beef production is in fact "taxed" in the current situation in Hungary, e.g. the value of processed pork products is on average 13% below the value it would have been without policy distortions.

Private profitability (as measured by PRC) differs quite significantly between products, even within the same industry. The most profitable products are beef pistol, sour cream and sour cherries. The least profitable are roast goose, green peas and skim milk powder. On average, beef and poultry production seems to be privately competitive, except for pork loin and roast goose.

Dairy production is not competitive for most products despite a high level of protection. The results for fruits & vegetables are mixed, but it has to be mentioned that these products are diverse and the data for this sector, especially on policy distortions, is rather weak.

From a social point of view (as indicated by DRC), it is relatively clear that meat and poultry production use domestic resources efficiently (roast goose should be considered as an exception), while dairy and fruits & vegetables would not be competitive under world market conditions.

Table5:Competitiveness indicators for food processing (Base scenario: Hungary 1997-99)

Industry	Product	DRC_HU	PRC_HU	NPC_HU
Meat	Pork (bone in)	0.83	0.98	-0.13
	Pork loin	0.92	1.09	-0.13
	Smoked pork leg	0.76	0.92	-0.13
	Sliced bacon	0.73	0.88	-0.13
	Sausage Bologna	0.77	0.95	-0.13
	Hungarian Salami	0.68	0.82	-0.13
	Beef (bone in)	0.75	0.93	-0.07
	Beef pistol	0.56	0.68	-0.07

Poultry	Roast chicken	0.85	0.88	0.30
	Chicken breast	0.87	0.88	0.30
	Roast goose	2.94	2.69	0.30
	Turkey breast	0.89	0.95	0.30
Dairy	Milk (pasteurized)	1.26	1.05	0.72
	Sour cream	0.90	0.69	0.72
	Butter	0.96	0.74	0.72
	Cottage cheese	1.26	1.07	0.72
	Skim milk powder	1.57	1.19	0.72
	Cheese Trappista	1.40	1.18	0.72
Fruits and Vegetables	Sour cherries	0.73	0.67	0.28
	Green peas	2.56	1.27	0.59
	Sweet corn	1.42	0.97	0.39

After an EU accession the situation changes quite significantly (Table 6). Protection levels are much higher in the EU compared to Hungary for most products, except for fruits & vegetables. The PRC and DRC indicators now become a slightly different meaning as in the base scenario. PRC now indicates the private competitiveness of Hungarian producers within the enlarged EU market, while DRC measures the competitive position in relation to third countries on the world market.

Table 6: Competitiveness indicators for food processing (Scenario: EU Accession)

Industry	Product	DRC_EU	PRC_EU	NPC_EU
Meat	Pork (bone in)	1.03	0.99	0.15
	Pork loin	1.17	1.11	0.15
	Smoked pork leg	1.03	0.94	0.15
	Sliced bacon	0.96	0.89	0.15
	Sausage Bologna	1.11	0.97	0.15
	Hungarian Salami	0.94	0.84	0.15
	Beef (bone in)	0.76	0.88	0.89
	Beef pistol	0.56	0.65	0.89
Poultry	Roast chicken	0.95	0.84	0.35
	Chicken breast	0.95	0.82	0.35
	Roast goose	3.14	2.33	0.35
	Turkey breast	1.02	0.91	0.35
Dairy	Milk (pasteurised)	1.29	0.96	1.13
	Sour cream	0.88	0.61	1.13
	Butter	0.94	0.66	1.13
	Cottage cheese	1.27	0.97	1.13
	Skim milk powder	1.56	1.05	1.13
	Cheese Trappista	1.40	1.07	1.13

Fruits and Vegetables	Sour cherries	0.67	0.65	0.11
	Green peas	1.26	1.15	0.10
	Sweet corn	1.10	0.88	0.27

From a private perspective Hungary would be competitive in the EU market for most products, even for most of the dairy products. Some exceptions remain for pork loin, roast goose, skim milk powder, trappista cheese, and green peas. However, caused by the generally higher level of protection, Hungary's competitive advantage on third country markets would weaken as an EU member, i.e. most DRC values are close to or above 1. A clear social profitability is now only given for beef products, sour cream and sour cherries.

This could have an important impact on Hungarian trade flows into other countries. If the market share of non-EU countries in Hungary's exports is large for certain products, EU accession would cause these trade relationships to deteriorate. The results in Table 6 support the assumption that EU membership would have so-called "trade diversion" effects. However, if the competitive advantage on EU markets more than offsets for trade losses with other regions, there would be no negative effect for the Hungarian economy. This problem would require a detailed analysis of bilateral trade flows in agricultural and food products.
The situation is changed again significantly, if additional technological change through FDI is taken into consideration. In fact, it can be shown that the technology effect caused by an EU accession could more than compensate for negative policy effects (Table 7).

Table 7: Competitiveness indicators for food processing (Scenario: EU Accession with increased FDI)

Industry	Product	DRC_EU_FDI	PRC_EU_FDI	NPC_EU_FDI
Meat	Pork (bone in)	0.80	0.76	0.15
	Pork loin	0.91	0.86	0.15
	Smoked pork leg	0.84	0.76	0.15
	Sliced bacon	0.77	0.71	0.15
	Sausage Bologna	0.90	0.78	0.15
	Hungarian Salami	0.76	0.69	0.15
	Beef (bone in)	0.60	0.68	0.89
	Beef pistol	0.45	0.51	0.89
Poultry	Roast chicken	0.76	0.66	0.35
	Chicken breast	0.76	0.65	0.35
	Roast goose	2.24	1.71	0.35
	Turkey breast	0.80	0.71	0.35
Dairy	Milk (pasteurised)	1.02	0.75	1.13
	Sour cream	0.72	0.49	1.13
	Butter	0.79	0.53	1.13
	Cottage cheese	1.00	0.76	1.13
	Skim milk powder	1.24	0.83	1.13
	Cheese Trappista	1.11	0.84	1.13
Fruits and Vegetables	Sour cherries	0.53	0.51	0.11
	Green peas	0.99	0.91	0.10
	Sweet corn	0.91	0.73	0.27

Technical change factor (Raw material, labor, energy saving)= 20%
Except for roast goose, now all products are privately competitive in EU markets, most of them even to a considerable degree (the overall average PRC value is around 0.75). With respect to the DRC it becomes clear that most products are also economically efficient. Even milk and cottage cheese are now just about competitive at world market conditions, which is an improvement compared to the situation before and after EU accession without additional technological change.
There are only three products which use domestic resources inefficiently. In the case of roast goose the overall cost structure is by far not adequate to compete on either domestic or world markets. Skim milk powder and trappista cheese can be produced at a private profit after an EU accession with additional technology transfer. However, more efficient technology is not able to offset the negative policy effects which makes these products non-competitive at world market prices.

Finally, Table8 provides a summary of the average indicators for the different scenarios covered in this section.[3] All sectors are on average privately competitive in the current situation in Hungary (PRC_HU). Poultry production presents an exception, but this is only due to a single product, i.e. roast goose. After EU accession the situation improves slightly for poultry, but significantly for dairy and fruits & vegetables. Additional FDI leads to strong additional improvements in all sectors.
With respect to social profitability the meat sector stands out as the only industry which is clearly efficient in the base scenario. An EU accession would lead to an improvement only for fruits & vegetables. Meat and poultry processing become significantly less competitive in world markets due to negative policy effects. However, most of these effects can be offset by additional technological change in scenario EU_FDI.

Table 8: Comparison of the results for food processing in all three scenarios

Industry	DRC_HU	DRC_EU	DRC_EU_FDI	PRC_HU	PRC_EU	PRC_EU_FDI
Meat	0.75	0.95	0.75	0.91	0.91	0.72
Poultry	1.39	1.51	1.14	1.35	1.22	0.94
Dairy	1.23	1.22	0.98	0.99	0.89	0.70
Fruits & Veg.	1.57	1.01	0.81	0.97	0.89	0.72

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4. Recommendations

Generally speaking, after an EU accession there is a good chance that for most products of the agro-food chain Hungary will have a favourable position within the enlarged European market, but these advantages will only materialise if production technologies are improved at both the primary and processing stages. It can be shown that policy conditions in the EU are beneficial to Hungarian producers in a private sense.

Two main conclusions can be drawn from these results. First, Hungary should avoid introducing any market-distorting policies, which would provide the wrong incentives for future investment decisions in the agro-food sector. On the contrary, as the EU is slowly moving towards more liberalised agricultural and food markets, Hungary has good reasons, given its favourable competitive position, to support further liberalisation. This would help to maintain a good position on markets outside the EU without

[3] These figures are only presented to provide a general overview. Simply taking the mean values of DRC and PRC for all products within one sub-sector might be misleading in some cases, because the relative volume of production is not taken into account. So the figures in this table have to be viewed carefully. Generally, with respect to the outcome of this study, it should be referred to Tables 7, 80, and 9.

having an adverse influence on competitiveness within the enlarged European market. Second, additional technology transfer is needed to improve and maintain the competitive position of the Hungarian agro-food sector in the enlarged EU. This is especially important, since the other candidate countries will compete with Hungarian producers on the markets for many agricultural and food products. Investment in new technology can come from two major sources: foreign or domestic. Foreign investment is likely to come primarily from private multinational companies.

Already now Hungary has very strong involvement of foreign companies in the food industry, compared to other transition countries. It has been shown that adverse expectations with respect to large FDI inflows are generally overrated while positive effects dominate. However, foreign companies tend to invest in highly profitable, large-scale industries. This might not fulfil all the relevant objectives of domestic policy-makers. If the share of small and medium-size enterprises, a strong rural economy and rural employment are at stake, there might be good reason for strategic domestic investment through well-designed structural policy measures. It is for example, not very likely that FDI will contribute significantly to technology improvement in primary agriculture. So the gap may widen between successful industries which become even more profitable through FDI and the less advanced sectors which fall back even further due the lack of capital. In this case government involvement through targeted investment programs could well be justified.

The main objective within the Hungarian strategy plan should be the establishment of competitive production and marketing chains, including both primary production and processing. There is not much use in having a strong production in raw products without efficient processing activities, and vice versa. This is especially true for livestock products which cannot easily be traded internationally as raw products. Since meat processing seems to be competitive and economically efficient, it might be reasonable to improve the performance of primary livestock production, in order to fully explore the economic benefits of the whole sector. The same holds for the poultry industry. Both meat and poultry products contribute also significantly to export earnings and seem to have strategic importance for Hungary.

Export statistics show that especially pork and poultry products account for significant shares in Hungarian agricultural trade. Pork accounts for 16 per cent and all poultry products together for 25 per cent of the total export value in 1999. In the case of pork this coincides favourably with a relatively strong competitive position, whereas the situation for the poultry sector is less clear, according to the PAM analysis.

No clear recommendation can be given for dairy products. As policy conditions will probably remain rather distorted in the enlarged EU, there will be a strong private incentive for dairy production in Hungary. Significant FDI inflows have occurred into dairy industries in recent years. These may be to some extent related to expected introduction of the EU quota system which will assure profitability in the future. However, even with improved technology most dairy products are only marginally efficient in economic terms. Moreover, primary milk production does not seem to be very efficient either, and there should be some doubt whether this sector qualifies for domestic investment support.

Fruits and vegetable production in Hungary seems to be privately competitive as well as economically efficient under EU conditions with improved technology. FDI involvement has also been strong in this sector in recent years, and there is no clear indication for the requirement of an additional strategic action.

One important criterion remains to be mentioned with respect to the Hungarian food industry. As overall resources will be limited in the process of EU integration over the next years, the main task is to set up a clear priority list as to which activities in the Hungarian agro-food system are considered of strategic importance. It would be neither very useful nor economically beneficial to establish a rather broad action plan trying to cover all present production activities in the same way. However, it has to be acknowledged from a political economy perspective that a well-targeted structural policy program might not always be feasible as it may not be supported or even strongly denied by the relevant

pressure groups.

The main results can be summarised as follows. In recent years primary agricultural production in Hungary is clearly divided into two groups. While crop products seem to be profitable not only under actual price conditions but also under world market conditions, livestock production is clearly not competitive and uses local resources inefficiently. If farm types are considered, some indication is given that large farms are more competitive in crop production, whereas livestock production. After EU accession it can be expected that primary agricultural production would become generally more competitive, except for pig production. This trend would be further enforced if an EU integration induces additional technology transfer through FDI. Compared to another important candidate country and competitor in agricultural markets, Hungary's agriculture has a favourable position in most agricultural products, but only if EU accession would induce strong technological improvements.

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