
THE INTERNATIONAL COMPETITIVENESS OF ROMANIAN AGRICULTURE

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1 INTRODUCTION

The aim of this paper is to assess the international competitiveness of Romanian agriculture by means of a quantitative analysis of the distortions between input and output prices faced by domestic producers compared against equivalent international (social) prices. The ability of Romanian producers to operate profitably at social prices given 1997/98 technical coefficients is assessed. Social profitability is an important indicator of a country's comparative advantage or disadvantage in the production of a particular good and in its ability to pursue opportunities to trade within a liberal international environment.

The paper is organised as follows. Section 2 outlines the methodology employed, which involves the estimation of three ratio measures of distortions and competitiveness. These ratios are derived from the construction of a policy analysis matrix (PAM) for eight agricultural commodities chosen because of their importance in consumer purchases and/or the degree of support afforded to them by the present Romanian government and within the Common Agricultural Policy (CAP) of the European Union (EU). These methods have been widely used in academic studies and in policy assessments by international development agencies. However, this study is the first application of the PAM framework to Romanian agriculture. To estimate the three ratios, a number of assumptions were made and these are explained in Section 3. The

results are presented in Section 4, with the main conclusions drawn out in the final section.

2. METHODOLOGY FOR ASSESSING DISTORTIONS AND INTERNATIONAL COMPETITIVENESS

An array of procedures and methods have been developed for estimating input and output distortions, trade and agricultural policy protection and measuring the international competitiveness of a country's agricultural production. This paper employs three indicators that are widely used in agricultural policy analysis: the nominal protection rate or coefficient, the rate of effective protection rate, and the domestic resource cost ratio.

2.1 Nominal Protection Rate (NPR) or coefficient (NPC)

The NPR is an indicator of the differential between domestic and international output prices for an agricultural commodity. Such differentials may be caused by trade policies (e.g. import tariffs, non-tariff barriers, government monopolies on trade), market imperfections, state agricultural policies and exchange-rate policies. For commodity i (in %):

$$NPR_i = \left(\frac{P_i^d}{P_i^b} - 1 \right) * 100 = (NPC_i - 1) * 100$$

where P_i^d is the domestic price and P_i^b is the border price (or world market reference price) of output i . The border price is usually expressed in US dollars (\$), while the domestic price is converted using the market exchange rate. Border prices should be adjusted back to the farm level by accounting for transport, storage, port and handling

costs. The NPR can be positive, when the domestic price is higher than the border price, and the output of the producer is nominally protected and the consumer is taxed, or negative, when the domestic price is lower than the border price so that the producer is nominally taxed and consumer subsidised. Positive, negative and zero NPRs correspond to NPCs greater than one, less than one and equal to one respectively. The most extensive use of NPRs for Central and Eastern Europe has been by Bojnec and Swinnen (1997), albeit without adjusting for transport and storage costs.

2.2 Effective Protection Rate (EPR)

The EPR is an indicator for measuring trade-, price- and exchange-rate-related distortions through tradable input and output prices of the value added of a particular product. The EPR captures transfers due to distortions in input as well as output price on the product's value added, i.e. output price (gross value) less specified (usually variable) traded input costs. The EPR for commodity i is defined as (in %):

$$EPR_i = \frac{VA_i^d - VA_i^b}{VA_i^b} * 100 = \left(\frac{VA_i^d}{VA_i^b} - 1 \right) * 100$$

where VA_i^d is the value added of output i at domestic prices and VA_i^b is the value added of output i at border prices. The EPR can be positive, negative or zero. A positive EPR indicates that the value added at domestic prices is higher than value added at border prices, and hence output i is “effectively” protected through the combination of domestic output and input price policy. In contrast, a negative EPR implies overall producer taxation: domestic value added is effectively taxed. When

EPR is zero, the output i is neither taxed nor subsidised, and value added at domestic prices is equal to the value added at border prices.

2.3 Domestic Resource Costs (DRCs)

The DRC ratio also measures the relative efficiency of domestic production in terms of its international cost competitiveness. The DRC coefficient compares the opportunity costs of using domestic primary resources - land, labour and capital - and of traded inputs in domestic production to the value added by that production if at border prices:

$$DRC_i = \frac{\sum_{j=k+1}^n a_{ij} V_j}{P_i^b - \sum_{j=1}^k a_{ij} P_j^b}$$

where a_{ij} ($j = k+1$ to n) is the technical coefficient (input use per unit of output) for domestic resource (non-traded intermediary input) j in the production of output i , and V_j is the shadow price of such an input. When the DRC ratio is smaller than 1, domestic production is efficient and internationally competitive because the opportunity cost of spent domestic resources is smaller than the net foreign exchange gained in export or saved by substituting for imports. A DRC ratio of less than one is thus taken as an indicator of long-run comparative advantage. The opposite is true when the DRC ratio is larger than 1 (Yao, 1997).

These three indicators are often derived from a policy analysis matrix (PAM) framework. The PAM is based on the simple formula of profits equaling revenue minus costs. To construct the matrix, costs are disaggregated into tradable inputs and non-tradable inputs (often referred to as domestic resources or factors). Profits, revenues and the two types of costs are then calculated using both actual prices (private prices)

and social (or “efficiency”) prices (FAO, 1992). The differences between private and social costs, revenues and profits are transfers whose magnitudes reflect the extent to which domestic prices diverge from efficiency prices. The structure of a PAM is indicated in Table 1.

For tradable inputs and output, social prices are measured as adjusted border prices. For domestic factors (land, labour and capital) for which no world market price exists, social prices are based on their domestic opportunity costs (i.e. what these factors would earn in their next best use, with the output of that use measured at border prices) (FAO, 1992). Within the PAM framework, the Nominal Protection Coefficient (NPC) can be calculated from Table 1 as cell A divided by cell E. The other two ratios can be expressed as:

$$\text{Effective Rate of Protection (ERP)} = (A - B) / (E - F)$$

$$\text{Domestic Resource Costs (DRC)} = G / (E - F)$$

The PAM accounting framework is a consistent means of tabulating information required for price policy analysis, and its construction aids understanding of the overall magnitude of distortions in the production of agricultural commodities. Its main limitation is that it is constructed for a specific year and thus needs to be altered as principal parameters (such as world prices of outputs and inputs, and yields) change over time. In some instances, even comparatively small changes in world prices may be highly significant in the assessment of whether a particular activity is socially profitable and unprofitable. However, once the PAM framework and component spreadsheets are constructed, parameter changes may be made relatively easily.

3. DATA COLLECTION, SOURCES AND ASSUMPTIONS

The competitiveness of Romanian agricultural production was assessed for eight main commodities (wheat, barley, maize, sugar beet, milk, beef, chicken and pork meat) and two markets (world and domestic). The estimation of NPCs, EPCs and DRCs utilised a number of data sources: the 1996 MoAF / World Bank Romanian Farm Survey, the 1997/98 World Bank voucher scheme survey, National Commission for Statistics Census returns, MoAF data and industry estimates.

3.1 Output Prices

Social prices for outputs and tradable inputs were taken as border prices (export / import parity prices), adjusted to the farm level by port and handling charges, transports, storage and maintenance costs (where appropriate). Drying, storage, handling and custom charges were given by Cargill representatives based in Romania during May 1998. For products for which Romania is a net exporter, an average f.o.b. export parity price was taken as the unadjusted reference price. For products for which Romania is a net importer, average c.i.f. import parity prices were used. Since Romania has oscillated between being a net exporter and importer of wheat, an average of the adjusted export and import parity prices for that commodity was taken in order to reflect trading patterns and conditions better.

3.2 Input Prices

Private input prices and quantities together with information on yields were taken from MoAF data and the two World Bank surveys. All the private prices used were average national prices, and no substantial analysis on a regional or sub-regional level was made.

Labour costs were based on *lei* values at the end of 1997, with different levels for skilled and unskilled labour. The social price of land was measured as its rental value in the most profitable alternative agricultural use. For example, if maize production represented the only alternative to wheat production, the social cost of land for the wheat activity was represented by the social profits (excluding land) from the production of maize (Monke and Pearson, 1989). However, a single clear alternative is often not evident as systems vary in terms of riskiness and the desirability of crop rotation. For example, vegetable crops often provide higher returns on average than staple food crops, yet many producers continue to grow food crops because of their greater price stability from year to year. In this situation, land values do not rise so high that staple crop production is eliminated, and land of identical quality produces a variety of crops. Following Pearson *et al.* (1987), an average of suitable commodity alternatives was taken for deriving shadow land prices, as social land values would probably fall somewhere in this range.

3.3 Farm Structure

For the four crops analysed (wheat, barley, sugar beet and sunflower), the DRCs were estimated for production by formal farming associations. It is hoped that this analysis will be replicated for informal (familial) associations and private household farming systems. Such disaggregation would take into account the wide variations in input use, yields and other production costs between farm types. The DRCs were estimated for non-irrigated land. The Romanian system of irrigation is highly inefficient and in a poor state of repair. Only 4% of private farmers in the 1996 World Bank sample made use of such services, and the mean yields of irrigated and non-irrigated land did not differ significantly. The social value of water in Romania is difficult to estimate, and given

the small number of farmers using irrigation services it was not possible to construct robust estimates of private and social revenues and costs of irrigated farming systems by individual commodity.

The technical coefficients used in the construction of the PAMs for pork and chicken were based on figures for the large state and former state complexes, which still dominate production for these commodities in Romania. Coefficients for the household livestock production, which is mainly for self-consumption, are likely to differ substantially. The technical information was supplied by Ministry of Agriculture and Food officials and was checked where possible with industry representatives (e.g. Union of Poultry Producers).

3.4 Time Period and Debt Treatment

The PAM coefficients were estimated for the period 1997/98. Prior to the two World Bank surveys, complete data on tradable and non-tradable input use by commodity was not available for Romania. As a result, the evolution of competitiveness as measured by DRCs cannot be estimated for previous years, although it is hoped that the analysis presented here will provide a basis for future research. In estimating private and social profitability in the period 1997/98, no adjustment was made for the debts of producers and the costs of debt servicing from previous time periods: the usual approach in estimating DRCs. However, while in a particular time period an enterprise's activities may be privately and socially profitable, the income generated may not be sufficient to cover the costs of debt servicing and repayment. In Romania, the debts accumulated by certain enterprises are highly significant and pose a severe threat to their long-run viability.

3.5 Sensitivity Analysis and Marginal Production

Sensitivity analysis provides a way of assessing the impact of changed assumptions in estimating both private and social profitability. The value of the Romanian *lei* has been unstable during the transitional period (with a large nominal depreciation), and changes in the exchange rate receive most attention in this analysis. The closer the DRC to 1, the more marginal is Romania's comparative advantage or disadvantage in the production of that particular commodity, and enterprises in this range are most susceptible to changes in world market prices and exchange rates. In contrast, the further the DRC is below 1, the more robust the level of international comparative advantage. Finally, it should be noted that the DRCs are estimated here are sector or production-type averages. Some producers, especially those entering or leaving the sector as marginal enterprises, may be considerably more or less efficient than the sector average, and so vary in their susceptibility to adverse changes in international prices or exchange-rate shifts.

4. RESULTS

4.1 Arable Sector

Tables 2, 4, 5 and 6 present the Policy Analysis Matrices for wheat, maize, sugar beet and sunflowers respectively, assuming yields of 3, 4.2, 27 and 1.4 tonnes per hectare for bread wheat, maize, sugar beet and sunflowers respectively, as grown by formal associations. These figures are based on farm-type average yields provided by the MoAF. The social and private values are shown per tonne and can be grossed up to provide the magnitude of total transfers for each production system in Romania. The three competitiveness ratios (NPC, EPC and DRC) are displayed under each table. An

example of the more detailed spreadsheets on which each of the PAMs is based is shown in Appendix 1.

The Romanian farm-gate price for wheat lies between the adjusted c.i.f. and f.o.b. border prices, and, using international prices at the beginning of 1998, Romanian wheat production is both socially and privately profitable (Table 2). However, the sharp downturn in international wheat prices since this date will have reduced Romania's comparative advantage and profitability. This instance highlights the sensitivity of the analysis (and farming systems with low tariff and budgetary protection) to changes in external parameters.

An attempt has been made in the case of wheat to adjust the private tradable costs for the effects of the Romanian voucher scheme. The scheme implemented in autumn 1997 was designed to increase the share of input supply by the private sector and provide transitional relief to farmers. Vouchers were delivered to all agricultural landowners, depending on the size of land owned, with a minimum threshold of 0.5 hectares and a maximum limit of 5 ha, so that farmers could receive between 1 and 6 vouchers. The vouchers could be exchanged for certified seeds and planting materials, fertilisers, pesticides, diesel oil and agricultural services. Input suppliers were then paid by commercial banks approved by the MoAF.

Quantifying the impact of the voucher scheme is complex. First, where farmers own both private plots and are members of formal associations, it is difficult to know which farm type benefits from the vouchers. Second, it is hard to know the breakdown of voucher use by crop type, especially given that many inputs are lumpy. A MoAF

survey of 384 small land-owning households (average holding size of 2.75 ha) on the impact of the voucher scheme found that 47% of households spent their vouchers on fertiliser, 27% on mechanical services, 19% on diesel oil, 9% on seeds and 2% on pesticides (Luca, 1998). If one assumes that the proportion of vouchers used in wheat production mirrors its overall share of crop production, the scheme could have lowered input costs by over 30% (Table 3).

In the absence of the voucher scheme, domestic tradable costs would have been above international prices.

Romanian maize production is both privately and socially profitable, albeit modestly in the former case (Table 4). Farmers are effectively protected by the domestic price being above the adjusted border price (NPC of 1.1), but are penalised by tradable and non-tradable costs being above social prices. The DRC, while indicating international comparative advantage, is nonetheless close to 1, and competitiveness will be sensitive to changes in world prices.

In contrast, sugar beet production is not profitable in either private or social terms. Again, while output prices are above equivalent parity prices, domestic tradable and non-tradable costs are above their social rates (Table 5). The DRC is significantly above 1, and it is difficult to envisage the bulk of sugar beet production in Romania being internationally competitive.

The oilseeds sector is more promising. Sunflower production is only marginally protected (NPC = 1.04) and is profitable by both private and social standards (Table 6). Moreover, in international terms, of the four crops analysed, sunflower production

is easily the most attractive. Romania's agro-climatic environment is conducive to this crop and, despite very low input use, internationally respectable yields are derived.

Considering the two main aims of the voucher scheme - enhancing the role of the private sector and competitive markets in input provision and the granting of transitional relief - the results of its implementation have been mixed. Input supply is still dominated by state-owned companies for fertilisers and seeds (Unisem/Semrom, Comcereals) and the hire of agricultural machinery (Agromechs, the privatisation of which slowed considerably in 1998/99). These input suppliers have also benefited not only by being the main recipient of vouchers but also from other direct budgetary support. In 1997, the MoAF budget set aside 200 bn *lei* was for fertilisers, 274 bn *lei* for irrigation and drainage, and 149 bn *lei* for certified seed subsidies. However, the domestic prices of tradable inputs such as fertilisers were still above world market levels. In this analysis, the NPCs for tradable inputs are all greater than one, and suppliers are protected by tariffs of up to 20%. If one adjusts for quality differentials, the magnitude of protection is larger.

There has thus been an asymmetry in treatment between agriculture and its input industries in Romania. While, as part of the ASAL loan, the former faced tariff reductions and the removal of price supports, the tariffs on inputs were not cut and domestic input suppliers have benefited from both direct subsidies and the voucher scheme. In some cases the voucher scheme only partially offset the higher prices for inputs. This distortion handicapped the agricultural sector while the input supply industry remained heavily protected. It is important for policy makers to realise that if one wants a low-subsidy, internationally competitive agricultural sector, farmers should

not be penalised through high input prices. The implementation of the loan has not, as yet, stimulated an international competitive input industry or allowed farmers access to externally produced inputs at world market prices.

Figure 1 charts the evolution of cropped areas in Romania between 1989 and 1997. As part of developing an internationally competitive sector, one would expect to see a specialisation in those commodities for which Romania has a comparative advantage. This has in part occurred: the cropped areas of maize and sunflowers have increased since the end of Communism, and the area of land given over to sugar beet has diminished. The wheat cropped area has been fairly unstable, and this in part reflects the frequent changes in policy intervention (and the incentives they presented) by previous governments.

4.2 Livestock Sector

Overall, Romanian meat and milk production is less competitive than crops by international standards. Livestock NPCs are higher than for the crops analysed and levels of effective protection are greater. Only for pork is the DRC estimate below 1 and in this case only marginally (0.97). The PAM for Romanian pork production is based on figures per tonne of liveweight production (Table 7). The technical coefficients used in this analysis were based on figures for the large state and former state complexes that dominate marketed production in this sector.

The largest share of domestically marketed pig production comes from these specialised state and former state-owned complexes (approximately 60%). Many of these enterprises are vertically integrated, and incorporate breeding activities,

slaughtering, processing, and sometimes retail shops. There were 55 large-scale pig meat complexes in Romania, of which, at the end of June 1998, 12 were privatised, 24 were proposed for privatisation by the end of the year, 7 were in administrative liquidation and 12 were in judicial liquidation (MoAF, 1998).

The calculations are based on a feed conversion ratio of 4.8 (4.8 kg of feed to 1 kg of meat gained), and a mortality rate of 5%. (For comparison, the UK figures are lower: feed ratios of 2.59 for rearing and 1.79 for breeding, and a mortality rate of 2.5% for rearing and 4.4% for breeding: MLC, 1997). The calculations for all the livestock products analysed allow for credit costs, based on the provision of working capital, but do not include the cost of meeting the interest on previous debts. For the state and former state complexes, these debts are considerable (Table 8). At the end of 1997, the total level of debt for the commercial companies operating in the pig industry was 3,120 bn *lei* with interest costs of over 1,311 bn *lei*. These costs account for the net loss made by the sector in that year (663 bn *lei*). These debts are a major disincentive to potential new foreign and domestic investors. If they could be removed, the sector would be both privately and socially profitable, albeit in the latter case only marginally.

Chicken production is effectively protected in Romania. Output prices are above adjusted border prices (NPC = 1.23) and profits at social prices would be negative (Table 9). As with the pig industry, poultry production is dominated by large state and former state-owned enterprises. Fifty-eight large poultry complexes dominated the urban market in 1997, and of these 14 were privatised, 19 proposed for privatisation, 11 in administrative liquidation and the remaining 14 in judicial administration. A feed conversion ratio of 2.6 and mortality rate of 10% was used in this analysis. These

figures were obtained from Ministry officials and checked by a representative from the Union of Poultry Breeders. Private tradable input costs are higher than if measured at social prices, largely because of higher feed costs.

Unlike pig and poultry, small-scale, fragmented producers dominate beef and milk production in Romania. Both beef and milk production are uncompetitive at international prices (Tables 10 and 11 respectively). The NPC for beef is comparatively high (1.31), with a mark-up of over 2.5 million lei per tonne of liveweight beef between domestic and international prices. A feed conversion rate of 15 and a mortality rate of 5% were assumed for the beef calculations. Tradable costs are again higher on the domestic market because of higher feed costs.

Romanian milk prices are higher than their international equivalents and the sector is not competitive by international standards (Table 11). This is readily understandable given an average herd size of less than two cows, with high transaction costs, unrealised economies of scale and an erratic and poor quality of supply. Less than 20 per cent of the milk produced in Romania is delivered to dairies with the rest consumed within the household. The milk that is sold to dairies by individual households tends to have high bacterial cell counts due to the lack of proper cooling facilities, and in some cases the poor quality of the raw material renders it only suitable for manufacturing cheese.

The small scale of private agriculture in Romania is highlighted in the results of the 1996 MoAF / World Bank survey, which found that the average size of milking herds

was 1.4; the comparable figure for pigs was 2.3. The largest private milking herd was 26 – tiny by international standards.

The PAM framework has not been extensively used for analysing the international competitive advantage of transitional countries, in part due to data limitations. However, the results for Romania can be compared with comparative analysis for the Czech Republic (Ratinger *et al.*, forthcoming) and Slovakia (Michalek, 1995). Overall, Czech cereal production was shown to have been competitive at world market prices for the period 1994 to 1996. The gross margin that could be earned from selling cereals on the world market was more than sufficient for covering the opportunity costs of domestic resources. However, as in Romania, the Czech livestock sector is not profitable at international prices and is socially inefficient. Michalek's (1995) analysis indicates that for barley, maize, sheep and pig meat Slovakian producers could be socially profitable. In contrast, the DRCs for Slovakian oilseed production (rapeseed, sunflowers) were well above one. In summary, both for the Czech Republic and Romania there is a difference between crop and livestock production with regard to international competitiveness. Romania appears to be more suitable for the production of oilseeds for the international market than either the Czech Republic or Slovakia.

5. CONCLUSIONS

The PAM framework provides a baseline for measuring the direction and magnitude of divergences between the prices faced by domestic producers and international (efficiency) prices in the main sub-sectors of Romanian agriculture. This framework can be readily adapted to incorporate future changes in domestic margins, international

prices and technical coefficients. The calculation of domestic resource cost ratios (DRCs) allows the comparison of efficiency among systems that produce unlike outputs.

Domestic prices for the eight Romanian commodities are all higher than comparative adjusted border prices (NPCs equal to or greater than 1), indicating that farmers are effectively protected. However, the degree of protection for wheat, sunflowers and maize is modest. The greatest output price protection is for milk and beef. Tradable input prices are, in general, also above international prices, reflecting the level of unreduced tariffs for these inputs and inefficiencies in domestic input supply industries.

At early 1998 international prices, DRC ratios are lower than 1 for the production of maize, sunflower and wheat production, indicating that these crops are socially profitable. Romanian farmers operating at social prices for output and inputs could make positive returns from these crops. In contrast, the DRC for sugar beet production is greater than 1, indicating that Romanian production for this crop is not internationally competitive. There has been some specialisation in agricultural production according to international comparative advantage during the period of transition: the area devoted to sunflowers and maize has increased while the cropped area of sugar beet has significantly diminished. However, further opportunities for specialisation exist, and Romania has the potential to expand its trade in sunflower products as part of an enlarged Single European Market.

As the prices of tradable inputs used by Romanian farmers are still above international prices overall, agricultural producers would benefit from a reduction in tariffs on

tradable inputs and the completion of privatisation of seed, fertiliser and feed milling enterprises. If farmers are expected to operate in a low-subsidy environment without price support, it is essential that inputs are available at internationally competitive prices.

At time of writing (spring 1999), only one of the eleven main fertiliser plants in Romania has been privatised, and all are protected by import tariffs for fertilisers. This means that these plants face little external competition in the domestic market, even though international prices for fertilisers are lower than those charged by Romanian producers. By removing these trade restrictions and opening up the market, the price of agrochemical inputs should fall. This would benefit the beleaguered farming sector that has been squeezed by input prices rising at a faster rate than output prices. Of all agricultural inputs and services, fertilisers are the closest to being pure private goods and as such are an obvious candidate for private supply (Carney, 1998).

Milk production in Romania is not internationally competitive, which is readily understandable given an average herd size of 1.4 cows with high transaction costs, unrealised economies of scale and an erratic and poor quality of supply. Even with the removal of price and budgetary supports, domestic milk prices are high by international standards. With a vicious circle of low retained earnings and sub-optimal asset bases, this problem could persist for a considerable time without assistance. The development of assisted leasing arrangements may be a method for increasing dairy herd sizes and ensuring that cows go to farmers who will farm them most efficiently.

Romanian beef and chicken meat production is also currently not competitive when measured in social prices. The outlook for pork production is slightly brighter. However, the costs of credit and debt servicing have had a major impact on the profitability of state enterprises producing pork and poultry. Sustained efforts to clarify the debts of state enterprises and to reduce accumulated debts are an essential element for improving the privatisation process. If these inherited debts were to be removed for pork-producing complexes, the analysis conducted here indicates that these enterprises could be socially profitable, albeit modestly. However, Romania upon accession will face strong competition for pork and poultry, for which there is no internal price support in the EU.

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TABLES AND FIGURES

Table 1: Generic PAM framework

	Revenue	Tradable Inputs	Domestic Resources	Profits
At Private Prices	A	B	C	D
At Social Prices	E	F	G	H
Transfers	I	J	K	L

Table 2: PAM for Romanian Wheat Production by Formal Associations (1997/98)

Figures in lei per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	950,000	550,382	297,038	102,580
Social	947,375	627,310	249,346	70,719
Transfers	2,625	-76,928	47,692	31,861

NPC	1.00
EPR	1.25
DRC	0.78

Table 3: Subsidy Equivalent of the Voucher Scheme for Wheat Production (Formal Associations) per hectare

Product	Quantity	Quantity covered by subsidy	Quantity without subsidy	Price (lei)	Total Value	Subsidy Value	Non-subsidy Value
Certified seed	241	137	104	1,979	476,939	271,123	205,816
Nitrogen fertiliser	70	50	20	1,329	93,030	66,450	26,580
Complex fertiliser	229	0	229	1,612	369,148	0	369,148
Fuel	219	108	111	2,223	486,837	240,084	246,753
Ploughing				146,250	229,294	146,250	83,044
Rotivation				148,770	148,770	0	148,770
Application of land treatments				299,219	299,219	0	299,219
Sowing				113,306	113,306	63,680	49,626
Harvesting				247,530	247,530	0	247,530
Total					2,464,073	787,587	1,676,486
Subsidy Equivalent					32 %		

Table 4: PAM for Romanian Maize Production by Formal Associations (1997/98)Figures in *lei* per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	700,000	403,789	287,444	8,767
Social	635,439	380,271	230,388	24,780
Transfers	64,561	23,518	57,056	-16,013

NPC	1.10
EPR	1.16
DRC	0.90

Table 5: PAM for Romanian Sugar Beet Production by Formal Associations (1997/98)Figures in *lei* per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	220,000	145,037	160,016	-85,053
Social	188,993	139,180	120,212	-70,399
Transfers	31,007	5,857	39,804	-14,654

NPC	1.16
EPR	1.50
DRC	2.41

Table 6: PAM for Romanian Sunflower Production (1997/98)Figures in *lei* per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	2,100,000	1,010,679	975,199	114,122
Social	2,023,454	936,304	869,352	217,798
Transfers	76,546	74,375	105,847	-103,676

NPC	1.04
EPR	1.00
DRC	0.80

Figure 1: The Evolution of Cropped Areas in Romania, 1989-1997 ('000 ha)

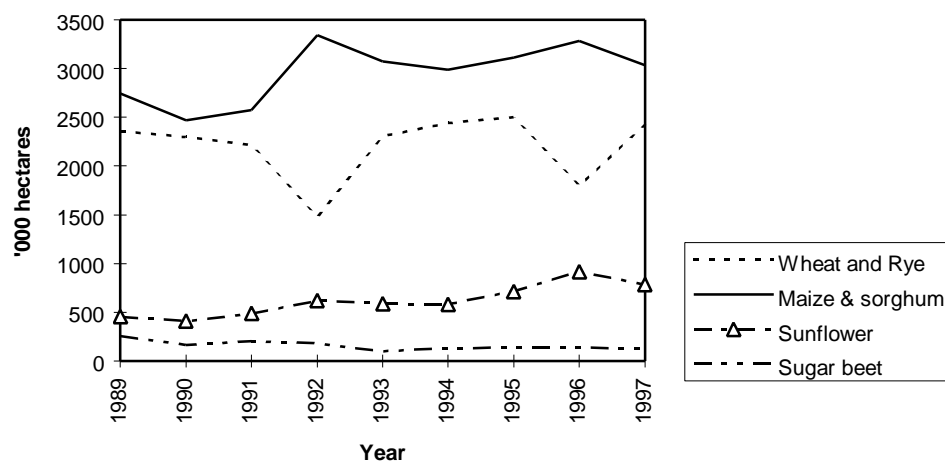


Table 7: PAM for Romanian Pork Production (1997/98)

Figures in lei per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	12,000,000	7,977,953	3,226,796	795,251
Social	9,451,466	6,457,995	2,889,858	103,613
Transfers	2,548,534	1,519,958	336,938	691,638

NPC	1.27
EPR	1.34
DRC	0.97

Table 8: Financial Performance in the Romanian Pig Industry (billion lei)

Form of Enterprise	Total Share Capital	Indebtedness				Net (+) Profit / (-) Loss	
		31.12.96		31.12.97		31.12.96	31.12.97
		Total	Interest	Total	Interest		
Total	1836.74	2140.39	381.55	3120.34	1311.54	-150.59	-663.16
of which:							
Privatised	269.12	366.54	64.08	528.77	195.76	-38.45	-146.60
CCs							
Admin.	86.71	84.14	15.28	118.41	54.88	-22.98	-81.07
Liq. CCs							
Jur. liquid	129.33	81.03	15.66	99.23	9.45	-10.82	-35.15
CCs							

CC = Commercial Companies, Admin. Liq. = administrative liquidation, Jur. Liquid = juridical liquidation.

Source: MoAF (1998)

Table 9: PAM for Romanian Chicken Production (1997/98)Figures in *lei* per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	11,700,000	6,900,245	2,856,928	1,942,827
Social	9,494,500	5,786,534	4,439,364	-731,398
Transfers	2,205,500	1,113,711	-1,582,436	2,674,225

NPC	1.23
EPR	1.29
DRC	1.20

Table 10: PAM for Romanian Beef Production (1997/98)Figures in *lei* per tonne

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	11,200,000	6,835,424	3,625,572	739,004
Social	8,542,772	5,528,367	3,478,421	-464,016
Transfers	2,657,228	1,307,057	147,151	1,203,020

NPC	1.31
EPR	1.45
DRC	1.15

Table 11: PAM for Romanian Milk Production (1997/98)Figures in *lei* per hectolitre

	Revenue	Tradable Costs	Domestic Factors	Profits
Private	3,000,000	719,540	1,334,790	945,670
Social	2,342,600	599,290	2,012,900	-269,590
Transfers	657,400	120,250	-678,110	1,215,260

NPC	1.28
EPR	1.31
DRC	1.15

Appendix 1: NPC, EPC and DRC Estimations for Sunflower Seeds (formal association)

BASE HYPOTHESES			
yield (Sunflower)	1.40 Tons/ha		
year	1997/98		
EXCHANGE RATES (<i>lei</i> per 1 US Dollar)			
	Actual	Shadow	
	8500	9775	
TRANSPORT COSTS			
Farm to integrator (truck)	850 <i>lei</i> /ton-km		
Integrator to mill, port, Bucharest (rail)	<i>lei</i> /ton-km		
MARKETING SCENARIOS			
Level of analysis	Market	Domestic Prices	Units
Farm gate	Acquis. Price	2100000	<i>lei</i> /ton
Import parity price - farmgate	cif	2023454	<i>lei</i> /ton
ANALYSIS OF PRIVATE PROFITABILITY			
Output Price (Private)	Pf	2100000	
Private Value of Tradeable Inputs	Ef	1010679	
Private Value-Added	$V Af = Pf - Ef$	1089321	
Total Value Non-Tradeables	VNf	975199	
Net Private Profitability			
	per ton BFN = $V Af - VNf$	114122	
	per hectare BFH = $BFN \times R$	159771	
ANALYSIS OF SOCIAL PROFITABILITY			
Reference Output Price	Po	2023454	
Social Value Tradeable Inputs	Eo	936304	
Social Value-Added	VAo	1087150	
Output Price (shadow exchange rate)	$Pr = Po * TCR/TCO$	2326972	
Social Value of Tradeable Inputs (shadow ER)	$Er = Eo * TCR/TCO$	1076749	
Social Value-Added (shadow ER)	$V Ar = VAo * TCR/TCO$	1250222	
Social Value Non-tradeables	VNr	869352	
Net Social Profitability per ton	$BEN = V Ar - V Nr$	380870	
COMPARATIVE ADVANTAGE ANALYSIS - PROTECTION COEFFICIENTS			
Nominal Protection on Product			
	NPC _p =	Pf/Po	1.04
	Shadow ER NPC _p =	Pf/Pr	0.90
Nominal Protection on Tradeable Inputs			
	NPC _i =	Ef/Eo	1.08
	Shadow ER NPC _i =	Ef/Er	0.94
Effective Protection			
	EPC =	$V Af/V Ao$	1.00
	Shadow ER EPC =	$V Af/V Ar$	0.87
Domestic Resource Costs			
	DRC =	$V Nr/V Ar$	0.80

Appendix 1 (continued): PRODUCTION COST ANALYSIS BUDGET Sunflower (1997/1998)

Non-irrigated	UNITS	QUANTITY	UNIT PRICE	UNIT COST	PRIVATE PAYMENT	TX/SUB TBLS	PRIVATE NTBLS	COST	TBLS	NTBLS
MATERIAL EXPENSES										
Improved seed (purchased)	kg/ha	6	30000	30000	180000	0	0	180000	2311	974
Improved seed (own production)	kg/ha			30000	0	0	0	0	0	0
Active substance (Urea)	kg/ha	0	1329	1329	0	0	0	0	0	0
of which free	kg/ha			1329	0	0	0	0	0	0
Active substance (DAP)	kg/ha	0	1900	1900	0	0	0	0	0	0
of which free	kg/ha	0		1900	0	0	0	0	0	0
Active substance (K)	kg/ha	0	1400	1400	0	0	0	0	0	0
of which free	kg/ha	0		1400	0	0	0	0	0	0
Complex fertiliser (NPK)	kg/ha	92	1612	1612	148304	0	0	148304	-65048	10936
Manure	tons/ha	0	17000	17000	0	0	0	0	0	0
Other soil additives	kg/ha				0	0	0	0	0	0
Herbicides	l/ha				0	0	0	0	0	0
Pesticides	l/ha				0	0	0	0	0	0
Fungicides	l/ha	1.00			0	0	0	0	0	0
Other materials	lei/ha				0	0	0	0	0	0
MECHANICAL SERVICES										
Ploughing, disking, sowing	lei/ha	1	491370	491370	491370	0	0	491370	55820	23340
Fertilising (1st)	lei/ha	1	50000	50000	50000	0	0	50000	5680	2375
Disc harrowing, levelling	lei/ha	2	148770	148770	297540	0	0	297540	33801	14133
Combinator	lei/ha	1	0	0	0	0	0	0	0	0
Seeding	lei/ha	1		113306	50000	0	0	50000	5680	2375
Fertilising (2nd)	lei/ha	1	50000	50000	50000	0	0	50000	5680	2375
Transport water, seed, fertiliser	lei/ha	1	0	0	0	0	0	0	0	0
Herbicide treatment	lei/ha	1	50000	74000	50000	0	0	50000	5680	2375
Combine-harvesting	lei/ha	1	166486	166486	233080	0	0	233080	26478	11071
Baling	lei/ha	1	0	0	0	0	0	0	0	0
Miscellaneous mechanical services	lei/ha	20%	218786	218786	43757	0	0	43757	4971	2078
LABOUR										
Salaries	lei/ha				28779	0	0	28779	0	6130
CAS (social security tax)	% wages	30%			8634	0	0	8634	0	8634

Unemployment (tax)	% wages	5%			1439	0	0	1439	0	1439
Production Budget (continued)			<i>UNIT</i>	<i>UNIT</i>	<i>PRIVATE</i>	<i>TX/SUB</i>		<i>PRIVATE</i>		
	<i>UNITS</i>	<i>QUANTITY</i>	<i>PRICE</i>	<i>COST</i>	<i>PAYMENT</i>	<i>TBLS</i>	<i>NTBLS</i>	<i>COST</i>	<i>TBLS</i>	<i>NTBLS</i>
Labour - general	Hours	42	5313	5313	223125	0	0	223125	0	47526
Input Supply Costs	lei/ha	20			170000	0	0	170000	12070	850
Indirect Costs										
General common expenses	lei/ha	5%			84886	0	0	84886	4244	8486
Local taxes	lei/ha				260	0	260	0	0	0
Working capital (direct expenses)	lei/ha	2026028	0%	30%	599482	0	0	599482	0	0
Calamity insurance	lei/ha				0	0	0	0	0	0
Land	lei/ha-season				0	0	0	0	0	0
Land tax	lei/ha-season					0	0	0	0	0
Rent	lei/ha-season					0	0	0	0	0
Transport, farm to integrator (truck)	Ton-km	50	1190	1190	59500	0	0	59500	6759	2826
Gross Cost of Production	lei/ha				2770156	0	260	2769896	104125	147926
By-Product Values										
Straw	tons/ha		168000	168000	0	0	0	0	0	0
Net Cost of Production	lei/ha				2770156	0	260	2769896	104125	147926
Yield	Ton /ha	1.4								
Total Cost: Farm gate Level 1	lei/Ton				1978683	0	186	1978497	74375	105661
Sale Price	lei/Ton				2100000	0	0	2100000	78943	112150
Gross Profit	lei/Ton				121317	0	-186	121503	4568	6489
Taxes on Profit (38 percent)	lei/Ton	38%			46100	0	-71	46171	1736	2466
Net Profit	lei/Ton				75217					
Net Profit on Cost	percent				3.8%					
	lei/ha				105303					
Gross Profit on Cost					6.1%					