MARTIN BANSE, WOLFGANG MÜNCH
AND STEFAN TANGERMANN*

Eastern Enlargement of the European Union: General and Partial Equilibrium Analysis

INTRODUCTION

With their accession to the European Union (EU), agricultural policies in the countries of Central Europe (CECs) will change more or less dramatically as they are aligned with the Common Agricultural Policy (CAP). These policy adjustments clearly have significant implications for farmers and food consumers in Central Europe, for market balance and trade in agriculture, for budget expenditure and for macroeconomic conditions. A quantitative analysis of the implications is a demanding task for economic analysis. For example, capital flows between the CECs and Brussels change fundamentally as 'financial solidarity' under the CAP as well as other EU budget mechanisms come into play. This may well affect exchange rates, which then at the micro level of agricultural markets have an impact on price formation, which at the same time is also greatly affected by the introduction of the CAP. Such micro-level changes in the agro-food sector can then – considering the economic importance of this sector in the CECs – again produce significant repercussions at the macroeconomic level.

A number of studies have made estimates of the quantitative implications of eastern enlargement in the area of agriculture. Anderson and Tyers (1993) and Frohberg *et al.* (1998) used a partial equilibrium model. Other studies have used agricultural general equilibrium models (Jensen *et al.*, 1998; Liapis and Tsigas, 1998; Hertel *et al.* 1997). While partial equilibrium models are richer in policy and commodity detail, agriculture in the general equilibrium models interacts with other sectors of the economy. Both aspects are of importance when analysing CEC–EU accession effects.

We suggest that an appropriate analytical approach to studying the effects of such sweeping policy changes at both the macroeconomic level and the level of individual agricultural markets is a combination of computable general equilibrium models and partial equilibrium models. This approach was outlined in general form by Banse and Münch (1998). The current paper summarizes

*University of Göttingen, Germany. The quantitative analysis presented in this paper is based on research pursued in the project on 'Agricultural Implications of CEEC Accession to the EU', funded by the European Commission (project FAIR1-CT95-0029).

the results of applying the method to studying the impact of CEC in the sector of food and agriculture.

We start with an overview of the model structures used and the scenarios studied, then turn to some major results achieved in the analysis, and finally draw some conclusions.

PARTIAL AND GENERAL EQUILIBRIUM ANALYSIS

The partial equilibrium model used here, named the European Simulation Model (ESIM), was originally developed by USDA/ERS in cooperation with Josling and Tangermann (Josling *et al.*, 1998). It was first used in Tangermann and Josling (1994), and further developed in Tangermann and Münch (1995) and Münch (1995). More recently, the model structure was further adapted to simulate CEC accession to the EU.

ESIM is a price and policy-driven comparative static, multi-commodity agricultural world model with rich cross-commodity relations and the possibility to model price and trade policy instruments in great detail. The model includes EU-15 and ten CECs. Of these there are five, the Czech Republic, Estonia, Hungary, Poland and Slovenia, which are in the first wave of accession negotiations. Later references to CEC-4 exclude Estonia, for which a CGE model is not yet operational. The other five countries are Bulgaria, Latvia, Lithuania, Romania and Slovakia. All other countries are aggregated into the rest of the world (ROW). The agricultural sector comprises 27 products, which include three dairy and six oilseed products. Trade is modelled as the residual of supply and domestic use.

The policy instruments in ESIM (minimum price, variable or fixed export subsidies/import tariffs, productions quota, set-aside, direct payments and so on) are modelled to closely match actual EU regulations as well as those proposed for the future CAP. For reasons of simplification, it is assumed that these instruments are applied in the CECs. When simulating EU accession, the levels at which the instruments are employed in the individual countries approach those of the EU. In a second step the integration of the CECs into the Single European Market is simulated by applying the instruments to the extended EU, that is, including supply and demand of all member countries.

Three alternative policy scenarios merit particular attention and will be analysed: (i) CEC accession to EU without adopting the CAP and continuation of the current agricultural policies in Central Europe can serve as a reference base (MEMBER/NO CAP). Two scenarios analyse accession under a reformed CAP as outlined in Agenda 2000: (ii) One takes the recent discussion into account which argues for *not* extending the compensatory payments for area and livestock to CEC farmers (AGENDA). The main argument for this option is that these payments compensate EU farmers for price declines resulting from CAP reforms from 1992 (Buckwell and Tangermann, 1999). Since CEC farmers generally face price increases during accession, it is argued that there is no need to 'compensate' them. The opposite point of view is that these payments are in part coupled to production and are not of a temporary nature,

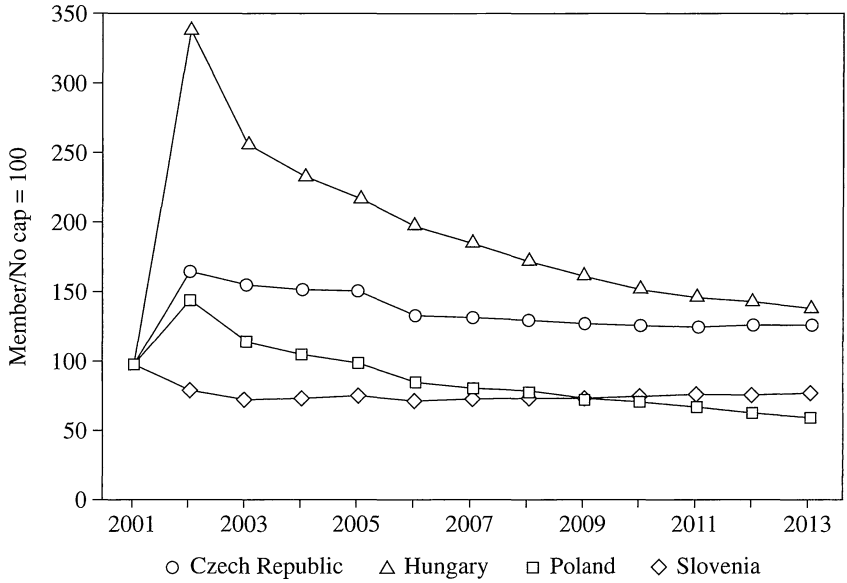
so that they are an integral part of CAP support to agriculture. Following this line of argument, (iii) an Agenda 2000 version is evaluated which grants the unified area payments and payments for beef cattle and dairy cows to the new members (AGENDA+DIR).

The CGE models developed for Central Europe take in the Czech Republic, Hungary, Poland and Slovenia. They are based on a model structure originally developed by Adelman and Robinson (1978) and further extended by Banse (1997) for Hungary. The models have a recursive–dynamic structure with a one-period time lag for the instalment of new capital, which is then assumed to be sector-specific within each period. They include two types of labour (low and high-skill workers) which are perfectly mobile across all sectors. Land is modelled as a specific primary factor in agricultural production. The models specify the behaviour of optimizing consumers in two different types of households (an urban and a rural household). Aggregate domestic demand in the model has four components: private consumption, intermediate demand, government and investment. The CGE models include the major macro balances: savings, investment, government deficit and the balance of trade. In the trade balance equation, the value of imports must equal the value of exports (both at world prices) plus exogenously set foreign savings and net foreign borrowing by the country governments. Hence the real exchange rate adjusts to achieve equilibrium.

The partial and general equilibrium models are combined in this analysis to exploit their respective comparative advantages. In a first round of analysis, nominal rates of protection (NPRs) resulting from ESIM simulations of the alternative detailed policy scenarios are implemented in the CGE models for the CEC. The resulting developments of macroeconomic variables in the CGE models (for example, real income, factor prices, prices for agricultural intermediates and real exchange rates) are reported as part of the analytical results. At the same time they are fed back into ESIM, which then generates information on detailed market developments. Details of the project can be found in various publications of the authors of this paper which are cited in the references.

SELECTED RESULTS

ESIM results show that the average level of agricultural protection increases in most of the CECs when the CAP is adopted, which is assumed to be 2002 (Figure 1). The specific change of average protection in each CEC depends on pre-EU national policies and country-specific production structures. Hungary exhibits the largest increase in production, by more than three times, for two reasons. First, the initial level of protection at farmgate level (domestic policies) is almost zero and, second, highly protected commodities under the CAP have a large share in Hungary's production structure. The other extreme is Slovenia, where the crucial products almost match CAP protection at farmgate level, but exceed it at wholesale and processing level (Bojnec and Münch, 1999). As a result, the integration of Slovenia into the Common Market in



Source: Münch (2000a).

FIGURE 1 *Ratio between NPRs in the AGENDA scenario and the MEMBER/NO CAP scenario*

2002 leads to a decrease of protection by more than 25 per cent. Poland and the Czech Republic face an increase of protection by 50 per cent and 30 per cent, respectively. However, in 2005, Poland's agricultural sector enjoys a protection level which is similar to the MEMBER/NO CAP scenario. After 2005, agricultural protection is even lower than in the reference scenario. Note that the change between scenarios in NPRs is also affected by exchange rate developments in the NO CAP scenario, which is one reason for the declining relative NPRs after 2002, as shown in Figure 1.

As a result of these developments in protection, aggregate production in the CEC-4 grows more rapidly than domestic use, which means that there is an increase in net exports of most products over time (see Table 1). There are, however, country differences. Hungary, the only country which is currently a net exporter of agricultural and food products, increases exports. Other countries like Slovenia continue to import major products. In markets for highly protected commodities under the CAP, such as some coarse grains, sugar and dairying, production expands significantly, which leads to mounting surpluses during accession, unless quotas severely restrict production (Münch 2000a; Banze, 2000).

As far as budget implications are concerned, ESIM generates projections only for net expenditure on trade measures, that is, export subsidies minus

TABLE 1 *Development of CEC-4 net exports under alternative policy scenarios (million tons)*

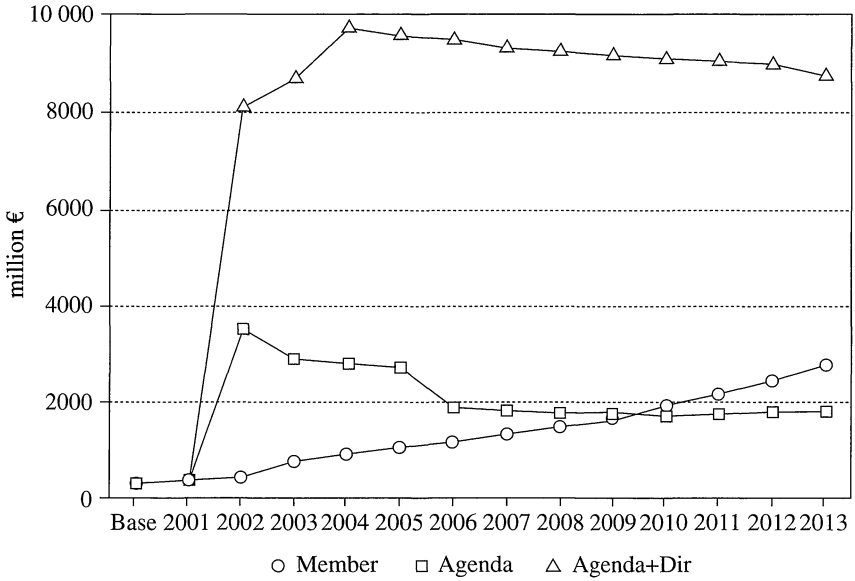
			2006			2013		
	1990–91	Base	MEMBER/ NO CAP	AGENDA	AGENDA + DIR	MEMBER/ NO CAP	AGENDA	AGENDA + DIR
Cereals	1.38	0.32	11.3	13.4	13.3	18.0	17.7	17.6
of which:								
Wheat	0.65	1.02	5.13	3.30	2.87	8.15	4.91	4.23
Coarse grains	0.73	–0.70	6.20	10.1	10.4	9.86	12.8	13.4
Oilseeds	0.44	0.18	0.56	0.05	0.08	0.71	0.35	0.37
Sugar	0.52	0.16	0.77	0.39	0.38	1.38	0.46	0.45
Butter	0.02	0.04	0.04	0.06	0.06	0.05	0.05	0.05
Beef	0.15	0.21	0.41	0.28	0.34	0.63	0.21	0.25
Pork	0.19	0.01	–1.38	–1.28	–1.55	–2.06	–1.87	–2.03

Source: Münch (2000a).

tariff revenues, as well as compensation and headage payments. To make the model results comparable with EU guarantee spending, conversion factors have been applied to include expenditure on administration and storage. These conversion factors are based on results for the EU-15 for the base period and the actual budgetary outlays for the products in the model.

Government spending for agricultural policies in the CEC-4 under their national policies (MEMBER/NO CAP scenario) gradually rises to EURO2.5 billion in 2013 as a result of growing net exports and increasing protection due to appreciating real exchange rates. Note that support prices are assumed to be set in national currencies so that exchange rate revaluation raises the level of protection. Integration into the CAP under the AGENDA scenario (that is, without direct payments), would result only in a limited expenditure increase, to EURO3.5 billion. Owing to real appreciation of the CEC-4 currencies against the EURO and the resulting market effects, public expenditure under AGENDA grows less then if the CAP is not introduced. As a matter of fact, after the Agenda 2000 cut in the milk price in 2006, market expenditure under AGENDA ends up less than under national policies in the CEC (Figure 2).

Complete introduction of the Agenda 2000 including direct payments (AGENDA+DIR) greatly raises expenditures, to close to EURO10 billion. The



Source: Model results and data from EU Commission (1997).

FIGURE 2 *Development of budgetary expenditure on market guarantee (inclusive of direct payments) in the CEC-4 under alternative scenarios, 2001 to 2013*

largest part of the extra expenditure is for direct payments for arable crops. Total expenditure on the CAP in the CEC-4 under this scenario is slightly less than what the introduction of the pre-Agenda CAP in the CECs would cost.

In the CGE analysis it turns out that the net trade position in agriculture of the individual CECs is an important factor determining most of the macroeconomic consequences of introducing the CAP. For agricultural net importers, the mechanism of 'financial solidarity' under the CAP leads to an outflow of financial resources (visible or invisible in the form of higher price paid on imports from other EU countries) to Brussels (or a reduction in net inflow of money transferred from Brussels). Therefore Poland and Slovenia, remaining net importers, exhibit a small decline in GDP after introduction of the CAP (Table 2). Hungary and the Czech Republic, as agricultural net exporters, enjoy an increase in net transfers from the EU budget and, as a consequence, both countries' GDP increases as a result of CAP introduction, in 2006 by 0.4 per cent in Hungary and by 0.2 per cent in the Czech Republic.

The changes in GDP beyond 2002 are caused by changes in the NPR of the agro-food sector, which differ from country to country (see above). The effects of 'financial solidarity' are also mirrored in the development of real exchange rates. In Hungary and the Czech Republic, the inflow of financial resources under the CAP makes the real exchange rate appreciate in 2002, and vice versa in Poland and Slovenia (Table 2). Later developments of the real exchange rate are partly conditioned by changes in agricultural protection.

The adoption of the CAP (without direct payments) in the AGENDA scenario has a negative impact on non-agricultural value added in those countries where agricultural support is expected to increase: Poland, Hungary and the Czech Republic (see Table 3). On the other hand, Slovene non-agricultural value added increases by almost 1 per cent owing to a reduction in agricultural protection. Because of differences in the relative increase of agricultural NPR (see Figure 1), there is a high increase in value added in Hungarian and Czech agriculture, a small increase in Polish agriculture and a strong decline in Slovene agriculture.

The inclusion of direct payments modelled in the AGENDA+DIR scenario reduces the decline in Slovene agricultural value added. In the other three countries the direct payments magnify the increase of agricultural value added. Non-agricultural value added begins to increase in the AGENDA+DIR scenario, which is due to an increase in available income in rural households.

The changes in Polish agricultural and non-agricultural value added are mirrored in the change in rural and urban household welfare (Table 3). Rural welfare in Poland improves very little after introduction of the CAP, though direct payments would increase household welfare by more than 21 per cent. However, in Hungary and Slovenia, the relative change in agricultural value added is much higher than the change in rural household welfare. This discrepancy is due to different shares of agricultural income in rural household income. While in Poland most rural income stems from agriculture, similar households in Hungary and Slovenia gain most of their income from non-agricultural activities. Therefore rural household welfare in Hungary rises only by 1.5 per cent in the AGENDA scenario and by 6.9 per cent in the AGENDA+DIR

TABLE 2 *Impact of CAP adoption (agenda scenario) on GDP and on real exchange rates, percentage changes relative to MEMBER/NO CAP scenario*

	GDP				Exchange Rate			
	AGENDA		AGENDA + DIR		AGENDA		AGENDA + DIR	
	2006	2013	2006	2013	2006	2013	2006	2013
Czech Republic	0.2	0.2	0.7	0.8	–1.1	–0.8	–3.5	–1.2
Hungary	0.4	0.1	1.3	0.9	–1.6	–0.4	–5.4	–2.9
Poland	–0.2	–0.1	1.1	0.2	1.0	1.3	–2.3	0.4
Slovenia	–0.3	–0.3	–0.2	0.1	1.0	0.5	0.6	0.2

Source: Authors' calculations. Under the definition used a negative change in the exchange rate represents an appreciation.

TABLE 3 *Impact of CAP adoption on sectoral value added in 2005, percentage changes relative to MEMBER/NO CAP scenario*

Value added	AGENDA	AGENDA + DIR	Welfare	AGENDA	AGENDA + DIR
Poland			*Poland*		
Agriculture	0.3	2.6	Rural households	0.2	21.1
Non-agricultural sectors	–0.3	1.1	Urban households	–0.3	1.0
Hungary			*Hungary*		
Agriculture	12.6	13.4	Rural households	1.5	6.9
Non-agricultural sectors	–0.2	0.9	Urban households	–0.3	0.5
Slovenia			*Slovenia*		
Agriculture	–13.2	–11.4	Rural households	–1.3	1.8
Non-agricultural sectors	0.9	1.0	Urban households	1.1	1.3
Czech Republic			*Czech Republic*		
Agriculture	14.8	17.8	Private households	0.3	5.3
Non-agricultural sectors	–0.5	–0.1			

Source: Banse (2000).

scenario. Because of direct payments and an increase in non-agricultural income, welfare in Slovene rural households actually increases in the DIR scenario compared with the level in the MEMBER/NO CAP scenario.

CONCLUSIONS

The results of our quantitative analysis using a combination of partial and general equilibrium models show, among other things, that CEC accession to the EU leads to an increase in agricultural production and growing exports in the region. This is likely to have a noticeable impact on total expenditure under the CAP, even if direct payments are not made to farmers in the CECs. However, if national policies in the CECs were to remain in place, their national expenditure on agricultural market policies might grow over time by even more than introduction of the CAP, as reformed under Agenda 2000, is likely to bring about.

The picture changes drastically, though, if direct payments under the CAP are extended to the CEC, adding another EURO6.5 billion to agricultural expenditure in the CEC-4. Eastern enlargement would then make overall CAP expenditure increase by around a third. At the same time, farm incomes in the CECs would also increase noticeably. This clearly shows the incentives in the political bargaining that is likely to take place during the accession negotiations where one side hopes to avoid extending the direct payments to CEC farmers, while the other side wants to obtain them.

Our results also show that inclusion in the CAP may have major macroeconomic implications and noticeable effects on non-agricultural sectors in all acceding countries. As a result of introducing the CAP, most CEC currencies may exhibit a tendency towards appreciation, and total savings and investment may fall. In CECs with a net agricultural export position, inclusion in the CAP and in 'financial solidarity' is likely to have a positive impact on GDP, while GDP is reduced in net importing CECs. However, consumers and non-agricultural sectors in three out of the four CECs included in the analysis are likely to suffer economic losses from extending the CAP to the CECs. Slovenia is the exception. However, such negative effects could be reduced if the CAP were further reformed before eastern enlargement of the community.

BIBLIOGRAPHY

Adelman, I. And Robinson, S. (1978), *Income Distribution Policy in Developing Countries – A Case Study of Korea*, Stanford: Stanford University Press.

Anderson, K., and Tyers, R. (1993), *Implications of EU expansion for European agricultural policies, trade and welfare*, Discussion Paper no. 829, London: Centre for Economic Policy Research.

Banse, M. (1997), *Die Analyse der Transformation der ungarischen Volkswirtschaft – Eine Empirische Allgemeine Gleichgewichtsanalyse unter besonderer Berücksichtigung des Agrarsektors und der Ernährungsindustrie*, Berlin: Duncker und Humblot.

Banse, M. (2000), 'Macro-economic Implications of EU-Accession', in S. Tangermann and M. Banse (eds), *Central and Eastern European Agriculture in an Expanding European Union*, Wallingford: CAB International.

Banse, M. and Münch, W. (1998), 'Die Einführung einer GAP auf den Märkten in den Beitrittsländern Mitteleuropas: Effekte der gegenwärtigen GAP und der Agenda 2000', Sonderheft *Agrarwirtschaft*, **3/4**, 180–90.

Banse, M., Guba, W. and Münch, W. (1998), '*Eastern Enlargement of the EU: How competitive is the Agri-Food Sector in Central Europe under EU conditions? The Example of Hungary*

and Poland', paper prepared for the EAAE/ISHS Conference, 'Understanding Competitiveness', Apeldoorn, 22–4 April.

Banse, M., Münch, W. and Tangermann, S. (1999), 'Accession of the Central European Countries to the EU: Implications for Agricultural Markets, Trade, Government Budgets and the Macro-Economy in Central Europe', in J.F.M. (Swinnen (ed.), *Agriculture and East–West European Integration*, Aldershot: Ashgate.

Bojnec, S. and Münch, W. (1999), 'Implications of Agricultural Accession to the European Union: The Case of Slovenia', in J.F.M. Swinnen (ed.), *Agriculture and East–West European Integration*, Aldershot: Ashgate.

Buckwell, A. and Tangermann, S. (1999), 'Agricultural Policy Issues of European Integration: The Future of Direct Payments in the Context of Eastern Enlargement and the WTO', *MOCT-MOST, Economic Policy in Transitional Economies*, special issue on 'Agricultural Transition and European Integration', **9**, 229–54.

European Commission (1997), *Twenty-Fifth Financial Report concerning the European Agricultural Guidance and Guarantee Fund E.A.G.G.F. Guarantee Section*, Brussels: European Commission.

Frohberg, K., Hartmann, M., Weingarten, P., Wahl, O. and Fock, A. (1998), 'Development of CEEC Agriculture under Three Scenarios – Current CEEC Policies, CAP 1995/96 and Agenda 2000', in M. Brockmeier, J. Francois, T. Hertel and P. Schmitz (eds), *Economic Transition and the Greening of Policies: Modelling the Challenges for Agriculture and Agribusiness in Europe*, Proceedings of the 50th European Seminar of the EAAE October 1996, Kiel: Wissenschaftsverlag Vauk KG.

Hertel, T., Brockmeier, M. and Swaminathan, P. (1997), 'Sectoral and Economywide Analysis of Integrating Central and Eastern Europe (CEE) Countries into the European Union (EU): Implications of Alternative Strategies', *European Review of Agricultural Economics*, **24**, 359–86.

Jensen, H., Frandsen, S. and Bach, C. (1998), *Agricultural and Economy-Wide Effects of European Enlargement: Modelling the Common Agricultural Policy*, Working Paper no. 11/1998, Copenhagen: Danish Institute of Agricultural and Fisheries Economics (SJFI).

Josling, T., Kelch, D., Liapis, P. and Tangermann, S. (1998), *Agriculture and European Union Enlargement. Markets and Trade*, Economics Division, Economic Research Service, Technical Bulletin no. 1865, Washington DC: U.S. Department of Agriculture.

Liapis, P. and Tsigas, M.E. (1998), 'CEEC Accession to the EU: A General Equilibrium Analysis', in M. Burfisher and E. Jones (eds), *Regional Trade Agreements and US Agriculture*, Economic Research Service, Agricultural Economics Report No. 771, Washington, DC: U.S. Department of Agriculture.

Münch, W. (1995), '*Possible Implications of an Accession of the Visegrad-Countries to the EU. Can the CAP do without Reform?*', Paper presented at the Agricultural Economics Society One-Day Conference, London.

Münch, W. (2000a), 'Effects of CEEC–EU Accession on Agricultural Markets in the CEEC and on Government Expenditure', in S. Tangermann and M. Banse (eds), *Central and Eastern European Agriculture in an Expanding European Union*, Wallingford: CAB International.

Münch, W. (2000b), 'Market and Budgetary Implications of Central European Accession to the Common Agricultural Policy: A Partial Equilibrium Analysis', Dissertation, University of Göttingen.

Münch, W., Bojnec, S. and Swinnen, J. (1998), *Exchange Rates and the Measurement of Agricultural Price Distortions in the CEECs and of CEEC–EU Accession Costs*, Working Paper 1/3, Joint Research Project, 'Agricultural Implications of CEEC Accession to the EU', University of Göttingen.

OECD (1998), *Agricultural Policies in Emerging and Transition Economies, Monitoring and Evaluation 1998*, Paris: OECD.

Tangermann, S. and Josling, T. (1994), *Pre-accession Agricultural Policies for Central Europe and the European Union*, study commissioned by GD I of the European Commission, Göttingen: University of Göttingen.

Tangermann, S. and Münch, W. (1995), *Agriculture in Poland, the Czech and Slovak Republics and Hungary and Possible Evolutions in the Medium Term – Using the ESIM Sector Model*, Final Report to the European Commission (DGVI), Göttingen: University of Göttingen.