Technical and Institutional Changes in an Enlarged EU: Welfare Effects for Old and New Members with a Focus on the Agri-food Chain

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Paper prepared for the Forth Annual Conference on Global Economic Analysis
Purdue University, June 27 - June 29, 2001

Abstract

Regarding the EU Eastern enlargement and possible developments in the dairy sector of the new member states two different scenarios were analyzed: The first one is the process of enlargement after the Agenda 2000. The second scenario is a technological and institutional change in new member countries after their accession into the EU. The analysis is done with an extended version of the general equilibrium model GTAP (Global Trade Analysis Project). The results show that an enlargement generates only small changes within the old EU, but can have huge effects for some sectors in the CEECs. Technical progress in the raw milk sector is mainly translated into higher quota rents while technical change in dairy production results in important price and quantity effects.

1 Introduction

The only thing sure about the European Union (EU) Eastern enlargement is that major changes will occur. Some will affect the old community while more pronounced changes can be expected for the new member states. The adoption of the political regime of the EU in Central and Eastern European countries (CEECs) will bring new policy measures that in a longer perspective will lead to new production and consumption possibilities and therefore more general structural adjustments. Crucial factors dominating those developments are the speed with which institutional changes can be introduced and the amount of technical progress that can be reached. These developments will vary between economic sectors, the most debated of which are agriculture and food.

Compared to the EU, agricultural production in most of the accession countries is characterised by lower costs for land, labour and other inputs. But depending on the national situation the disadvantages can be more dominant: On the supply side quite common problems are a lack of capital coupled with a low level in technology. Additionally, difficulties in management and marketing activities as well as insufficient infrastructure can lead to inefficiencies. Further problems may

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arise from insufficient quality standards, a low degree in product innovation as well as hygienic and environmental issues. On the demand side modest incomes and consequently low purchase power hinder the development of the markets.

Problems are manifold but not alike across all accession countries. The same counts for the choice of political instruments. More often than not producer and consumer prices in the accession countries are lower than in the EU. But domestic markets are protected in different ways, sometimes even taxed (HARTMANN, 2000). Due to the differences between the countries and possible sources of error resulting from generalizations this paper differentiates between three important countries and regions seeking entrance into the EU: Poland, Hungary and the rest of the Central European associates.[2]

We also focus on some main activities: the raw milk and dairy sector. Raw milk production is the most important agricultural activity in EU forming 18% of the total agricultural output (EU COMMISSION 2000). In the CEECs the raw milk and dairy sector is also of major importance. In Poland for example, over 14% of the total agricultural output is provided by raw milk production, holding the third biggest share. As for marketable production the second largest part almost 18% belongs to the dairy sector (POLISH MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT, 2000). But, despite their economic importance the raw milk and dairy sectors in CEECs are often characterised by a fragmented production structure, a lack of capital and out of date technology. Therefore, those sectors incorporate a high potential for technical progress and are particulary susceptible to new institutional arrangements. With the introduction of the milk quota scheme in the accession countries prices are likely to rise. Another effect of the implementation of this very instrument may be that an increase in efficiency in the raw milk and dairy sector is hindered. This paper tries to analyse possible effects that may occur within this web of political restrictions and technical developments.

The impacts of the accession itself has been studied in detail by different authors. For an overview of studies done with GTAP analyzing the EU enlargement see NIELSEN (1999A). Further studies analyzing this process are e.g. BANSE et al. (1999) and FROHBERG (2000). Compared to that studies concentrating on the dairy sector are quite rare, e.g. POLISH MINISTRY OF AGRICULTURE AND FOOD ECONOMY (1994), BAAS et al. (1998) and PANAYOTOVA (1999).

The aim of our paper is firstly to capture the main effects of an enlargement and secondly, to go one step further by focusing on the post-enlargement impacts of changes that may result from technical progress and institutional reform.

[2] The group "rest of Central European associates" consists of Bulgaria, Czech Republic, Romenia, Slovakia and Slovenia.

2 Theoretical Framework

2.1 The Standard GTAP Model

The quantitative analyses in this paper is based on the comparative-static standard multi-regional GTAP model which provides an elaborate representation of the economy including the linkages between farming, agribusiness, industrial, and service sectors of the economy. The use of the non-homothetic constant difference of elasticity (CDE) functional form to handle private household preferences, the explicit treatment of international trade and transport margins, and a global banking sector which links global savings and consumption is innovative in GTAP. Trade is represented by bilateral trade matrices based on the ARMINGTON assumption. Further features of the standard model are perfect competition in all markets as well as a profit and utility maximizing behavior of producers and consumers. All policy interventions are represented by price wedges. The framework of the standard GTAP model is documented in the GTAP book (HERTEL, 1997) and available on the Internet (http://www.agecon.purdue.edu/gtap).
Technical progress can be implemented in the GTAP model as a Hicks-neutral technical progress in the final output as well as a non Hicks-neutral change in productivity of endowments and intermediates. Both parameters increase factor productivity and thereby influence other economic activities. Due to the competition for scarce resources and production factors between the sectors, a change in e.g. the dairy sector will induce a change in other sectors leading to a new distribution of production factors in the overall economy. In a first attempt to model technical and institutional changes in the CEECs we used the variable for technical progress in the final output, hereby concentrating on the most direct effects for specific sectors.

2.2 Extensions

Agriculture is not only particularly important in the analysis of the enlargement of the EU to include CEECs, but also characterized by a high level of public interventions. For this reason it is of major importance to explicitly model agricultural policy instruments. NIELSEN (1999B) for example shows that simulation results of different EU enlargement scenarios differ significantly when the modeling approach shifts from ad valorem equivalent representation of policies to explicit modeling of the Common Agricultural Policy (CAP). In the present analysis we therefore adapt the GTAP model to include important institutional features of the CAP.

2.2.1 Direct Payments

Direct payments to livestock and land are important instruments of the CAP. Several approaches to implement them in models can therefore be found in the literature. BACH and FRANDSEN (1998), JENSEN, FRANDSEN and BACH (1998) and GOHIN, GUYOMARD and MOUËL (2000) introduced direct payments to land as exogenous input subsidy to land. Suckler cows and breeding ewes are assumed to be part of the production capital, which is used to produce slaughter animals. Accordingly, the premiums for them are implemented as fixed input subsidy to capital. In contrast to that, male animals and steers are considered to be final products and sold directly to the market. The premiums for them are kept in the model as output subsidies. If the base area for land or the ceiling on premium rights for breeding ewes, male animals and steers is fully utilized, the total amount of direct payments are set exogenous, whereas the tax rate is allowed to adjust. Following this approach VAN MEIJL and VAN TONGEREN (2000) also implement compensatory payments as input subsidies. Given the fact that the area payments in 1995 (the base year of their data base) were much larger then total land costs of land in the data base, they introduce hectare and head premiums as input subsidy to value added. A more extreme approach is followed by BLAKE, RAYNER and REED (1998) who treat compensatory payments as a transfer from government to the »farm household«. Compensatory payments are therefore paid to sector specific agricultural factors.

Table 1: Comparison of Old and New Input Subsidies in the GTAP-Database (in million '97 US$)

product	endowment	old	new
cereals:	land	27795	13650
	capital	6643	3615
sugar:	land	238	127
other crops:	land	11058	2813
	capital	2074	620
cattle:	land	156	46
	capital	19077	4369
raw milk:	land	350	109
	capital	24	0
animal products:	land	223	147
	capital	447	0
total		68085	25496

In contrast to earlier versions of the GTAP database, the most recent version 5.3 includes direct payments along the lines of BACH and FRANDSEN (1998) and JENSEN, FRANDSEN and BACH (1998). We used the share of input subsidies for each agricultural sector in the GTAP data base entitled to direct payments, but implemented the numbers taken from the statistics of the EU Commission (EUROPEAN COMMISSION, 1998)

and integrated them into the GTAP data base using a slightly different procedure[3] than the one described in MALCOM (1998). Table 1 offers an overview of the numbers. Furthermore, it is assumed that the hectare and head premiums are fully utilized, so that an exogenous input to capital and land is accompanied by an adjustable input subsidy rate.

2.2.2 Restriction in Production

One restriction the CAP puts on inputs is the compulsory set-aside. This policy instrument is handled in different ways in quantitative analysis. KILKENNY (1991), BLAKE, RAYNER and REED (1998) and VON LAMPE (1999) make land specific to cereals production, so that it is immobile between sectors. Set-aside can then be modeled as a reduction in the volume of land used in the specific sector (BLAKE, RAYNER and REED, 1998).[4] A set-aside restriction can also be implemented as a reduction in production specific land. BACH and FRANDSEN (1998) show that set-aside requirements can also be modeled as a negative productivity shock to agricultural land in the specific grain sectors. The allocation of one hectare of land to these sectors therefore has a reduced productivity of, say, the equivalent of 0.95 hectare. The advantage of this approach is that no ad hoc assumption like factor specificity is necessary. For this paper the last option has been chosen.
Another quantitative restriction within the CAP is formed by the quota regime for milk and sugar. Again there are several options for this problem (FRANDSEN 1998; VAN MEIJL and VAN TONGEREN 2000). We chose the general idea of fixing the production of quota products by making output exogenous. This variable is then swapped with another instrument, in our case output subsidy (to), allowing for necessary adjustments that occur within a simulation. The increase or decrease in the output subsidy can then by interpreted as a change in the quota rent.

2.2.3 EU Budget

The fiscal impact of CEEC accession to the EU on the European Union's budget is a much debated issue. Particularly the discussion on the kind of CAP needed to make the integration of new member countries feasible and in accordance with the guideline of the common agricultural budget is a focal point in the analyses of the European enlargement. Most studies analyzing the enlargement of the EU to the East therefore take parts of the EU budget into account and calculate the additional costs resulting from the integration (e.g. FROHBERG, 2000). Studies based on general equilibrium models are able to cover more elements of the common budget of the EU. HERTEL, BROCKMEIER and SWAMINATHAN (1997) introduce a new fiscal

[3] The shocks to implement direct payments are rather high. A solution of the model is much easier to achieve when the input subsidy is set exogenous and shocked to the desired amount, while the input tax rate is allowed to adjust.

[4] This approach might especially be an option in an analysis with a short run focus.

entity in their model called "Brussels" which makes disbursement to member countries in order to finance their food and agricultural policy expenses. Brussels' revenue contributions in the model are 90% of all import tariffs revenues and a GDP contribution calculated as an endogenous tax to cover any deficit in the EU budget. LIAPIS and TSIGAS (1998) employ a similar procedure calculating the budget expenditures and the tax rate on income required to generate the revenues necessary to finance the CAP and to balance the budget. BACH and FRANDSEN (1998), JENSEN, FRANDSEN and BACH (2000) and NIELSEN (1999B) introduce a single equation that captures the cost of introducing compensatory payments as well as output and export subsidies in CEECs net of new members' contribution to the CAP expenses. The latter consists of an exogenous share of GDP and tariff revenues from agricultural imports.

The EU budget is absent in the standard GTAP model. In this paper we therefore follow the approach of HERTEL, BROCKMEIER and SWAMINATHAN (1997), but use a newly developed Social Accounting Matrix (SAM) to introduce the European Agricultural Guidance and Guarantee Fund (EAGGF) of the EU budget into the GTAP model (BROCKMEIER, forthcoming in 2001). In a SAM receipts are usually listed along rows, whereas expenditures are given down the columns. To fit the EU budget as a new agent into the SAM, income and expenditures are however organized in a different way. Table 2 represents a SAM for the GTAP model that includes expenditures and revenues of the EU budget in one row. Thus, the EU receives 90% of all trade generated import taxes from producers, private households, government, and capital account. Additional income is obtained in form of GDP and value added tax paid by the regional household to the EU budget. This income is used to cover output and export subsidies, direct payments of the agricultural sector as well as a net income transfer to or from other EU member countries. The EU budget is balanced via an endogenous GDP tax common to all member countries that is determined by the following equation:

$$RGDP = \frac{SPTAX + SDIPAY + SXTAX - SMTAX - SVATAX}{SGDPEU} \qquad (1)$$

Where:

RGDP	endogenous GDP tax rate common to all EU member countries
SPTAX	agricultural output subsidies of all EU member countries
SDIPAY	agricultural direct payments of all EU member countries
SXTAX	agricultural export subsidies of all EU member countries
SMTAX	90% of all import taxes of all EU member countries
SVATAX	value added tax of all EU member countries
SGDPEU	GDP of EU

The EU budget is implemented in the GTAP model with the help of dummy variables in the equation calculating the income of the regional household and the parts of the EU budget described earlier. This allows switching on whichever component the user would like to be part of the EU budget by shifting the receipts

and expenditures from the regional household to the EU account. Thus, in a preliminary simulation the GTAP database is moved from an initial situation to a new equilibrium where the EU budget is in charge of the EAGGF.[5] This mechanism is also used when new member countries are integrated into the EU. It also permits to analyze policy options like co-financing of the CAP by EU member states, which is currently discussed in Europe. Once the EU budget is put into practice it is straightforward to calculate the SAM displayed in Table 2 out of the updated GTAP database with a supplementary program written in GEMPACK.

The extended GTAP model does not provide a comprehensive projection of the change of the EU budget due to the fact that the disbursement of structural funds is not included. However, since agriculture is the single largest component of greatest concern in the context of CEEC integration, this treatment of the EU budget is a good starting point.

5 We would especially like to thank Ken Pearson for his support to implement this feature.

Table 2: Micro-SAM of the GTAP model with EU-Budget

	producer		value added	final demand						
	agricultural sector	**non agricultural sector**	**factor**	**private household**	**govern-ment**	**capital account**	**regional household**	**EU-budget**	**rest of the world**	**sum**
→ revenues expenditure ↓	∀j∈AGRAR (1)	∀j∈NAGRAR (2)	∀i∈ENDW (3)	(4)	(5)	∀j∈CGDS (6)	(7)	(8)	(9)	
agricultural sector (1)	intermediate demand			private household consumption	government consumption	Investments	non-agricultural export subsidies	agricultural. export subsidies	exports	agricultural sales
non-agricultural sector (2)										non-agri-cultural sales
factor (3)	factor income									factor income
private household (4)							private household income			private household income
government (5)							government income			government income
capital account (6)							savings		net capital transfer to ROW	savings
regional household (7)	net taxes[1)]		factor income	net taxes[2)]	net taxes[2)]	net taxes[1)] - depriciation	non-agricultural export subsidies			regional household income
EU-budget (8)	90% of import tariffs, direct payments, out-put subsidies	90% of import tariffs		90% of import tariffs	90% of import tariffs	90% of import tariffs	GDP tax, value added tax	agricultural export subsidies	net income transfer to EU	0
rest of the world (9)	imports	imports		imports	imports	imports				imports
sum	cost of agricultural production	cost of non-agricultural production	factor income	private household expenditure	government expenditure	investment	regional household expenditure	0	exports	

1) Net taxes for agriculture include 10% of import tariffs and taxes on/subsidies for imported and domestic intermediate inputs. Net taxes for non-agriculture include 10% of import tariff, taxes on/subsidies for output, factor input, imported and domestic intermediate inputs. 2) Net taxes for private household and government include 10% of import tariffs and taxes on/subsidies for imported and domestic commodities.

Source: BROCKMEIER, 2001, pp. 144

3 Data

The data set used was the GTAP database version 5.3 with 1997 as the base year. This version was aggregated into a set of six countries or regions and twelve products (see Table 3).

Table 3: Aggregation of the GTAP-Database, Version 5.3

Regions	Sectors
EU 15 (EU) **Poland (PL)** **Hungary (HU)** **Rest of Central European associates (RCCE)** **Main milk exporting countries (MilkEx)** Australia, New Zealand, Argentina, Uruguay **Rest of the World (ROW)** USA, Canada, Mexico, Brazil, Chile, Colombia, Peru, Venezuela, Central American and Caribbean, Rest of Andean Pact, rest of South America, Hong Kong, Singapore, Sri Lanka, Taiwan, Vietnam, Bangladesh, Indonesia, Malaysia, Philippines, Thailand, China, India, Japan, Korea, rest of South Asia, Switzerland, rest of EFTA, Former Soviet Union, Turkey, Morocco, rest of North Africa, Botswana, rest of SACU, Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, other Southern Africa, Uganda, rest of Sub-Saharan Africa, rest of the World	**Raw milk (rmk)** **Dairy products (dairy)** **Cattle (cattle)** **Other animal products (oap)** **Meat (meat)** bovine cattle, sheep and goats, horse meat products, meat products nec **Cereals (cereals)** paddy rice, wheat, cereal grains nec **Other crops (ocr)** oilseeds, vegetables, fruits, nuts, crops nec **Sugar crops (sugar)** **Other food products (ofp)** vegetable oils and fats, processed rice, sugar, beverages and tobacco products, food products nec **Other primary production (oprim)** plant-based fibers, wool, silk-worm cocoons, fishing, forestry, coal, oil, gas, minerals nec **Manufactures (mnfcs)** chemicals, textiles, wearing apparel, leather products, wool products, paper products, publishing, petroleum, coal products, mineral products nec, ferrous metals, metals nec, metal products, motor vehicles and parts, transport equipment nec, electronic equipment, machinery and equipment nec, manufactures nec, electricity, gas manufacture, distribution, water, construction **Services (svces)** trade, transport, financial, business, recreational services public administration and defense, education, health, dwellings

4 Scenarios

The scenarios were selected with the aim to describe the general effects of an increase in productivity in the raw milk and dairy sector in the CEECs after their accession into the EU.

Agenda 2000

In modeling an Eastern enlargement we have to make some assumptions about the policy which will apply to the old and new member states at the time of the accession. For the current EU members the Agenda 2000 serves as a political guideline for the next years. Therefore the simulation of this reform is a prerequisite for any further scenario. The Agenda 2000 was modeled as follows:
The direct payments in the model were increased for cereals and raw milk and decreased for other crops according to the rules of the Agenda 2000. The cut in intervention prices for cereals and raw milk was simulated by a reduction in trade protection of 15%.[6] The milk quota was expanded by 2.4%. Finally, the set-aside restriction was implemented. Here we assumed that the 1997 database includes a compulsory set-aside rate of 15% which is reduced within the Agenda 2000. Therefore, we have implemented an increase in the efficiency of land in the cereals and other crops sector. Concerning cattle, it is assumed that the decrease in prices is compensated by the bundle of new premiums introduced into the cattle and meat sector.[7]

Enlargement

The enlargement process was simulated as a complete and immediate transfer of all CAP instruments into the new member states, the only exception being direct payments. The discussion about the direct payments is still ongoing with no end in sight. Due to the financial restrictions formed by the agricultural guideline we have opted for a non-transfer of this very instrument. The quota for sugar and milk was fixed at the pre-accession production level. Within the enlargement scenario we have also expanded the EU budget mechanism, described in chapter 2.2.3, to the CEECs.

Technical and Institutional Change

Technical as well as institutional changes will be a part of the accession process. Concerning the first, the general direction appears quite clear: Technical change can be safely assumed as progress leading to an increase in efficiency. This assumption does not necessarily hold for institutional changes. The transformation, which in some cases is still ongoing, as well as the enlargement process, brings

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6 This approach is a rather rough estimate of the effects resulting from a decrease in intervention prices Another possibility would be the introduction of an intervention price system like it is done by VAN MEIJL and VAN TONGEREN (2000) based on a concept of SURRY (1992).

7 The results of this pre-simulation will not be discussed in this paper, they only serve as a starting point for the accession scenario.

severe changes into the institutional system of the CEECs. This can result in a temporary lack of institutions which can be followed by a decrease in efficiency. In our scenarios, however, we assume a rather quick and successful building of new institutions, strengthening the positive effects of technical progress. With respect to these assumptions we formulated two different scenarios, both looking at the effects five years after the accession. The first one (TECH1) implies an increase in efficiency of 2% per year (10.5% in total) in the raw milk sector of the CEECs. The second option (TECH2) contains the same shock together with an increase in efficiency of 3% per year (16 % in total) in the dairy sector.[8] We applied a higher shock in the dairy sector because we assume that this more industrialized branch has a higher potential for innovations.

5 Results and Discussion

5.1 Enlargement

As was found in other studies as well (e.g. MANEGOLD ET AL, 2001), the general price and quantity effects for the milk exporting countries and the rest of the world are negligible and rather small for the old EU members (see Table 4). In the raw milk sector prices are declining, resulting in a lower quota rent.

The impact for the new members, as could be expected, is much stronger. Poland, the largest new member state, particularly expands its cattle production because of the increase in market price.[9] Although the price change in raw milk and dairy is even higher, it has only a small impact on production due to the fixed raw milk supply. As one consequence the quota rent for milk increases. The prices for most other agricultural products decline, generating a lower output.

In Hungary, the effects concerning prices and quantities are quite high, often reaching more than 10%. Market prices are increasing for all products, with the highest rates for raw milk, cattle, and cereals. Again, with the exception of raw milk, these price changes are transformed into higher output.

The price and quantity reactions in the RCEE are moderate. Higher prices are obtained in raw milk, dairy, other food products, and especially meat. The declining output in meat and other food products results from a lower demand from private households and a decrease in exports.

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8 The shocks are quite moderate, but we have to keep in mind that we have not implemented any change in the EU-15, therefore assuming that the CEECs have a technical progress of 2%-3% above the old members.

9 Compared to the price changes in Hungary this reaction seems to be rather high. One possible explanation might be that the Polish cattle production, which in large parts of the country is quite old-fashioned, incorporates a high potential for efficiency gains.

Table 4: Enlargement: Changes in Quantities, Prices and Quota Rents

	Poland	Hungary	RCEE	EU	MILK_EX	ROW
			change in production (%)			
rmk	0.0	0.0	0.0	0.0	-0.3	-0.1
dairy	2.7	3.3	2.6	0.1	-0.5	-0.2
cattle	23.9	16.3	4.9	-1.6	-0.2	-0.1
oap	-4.3	14.8	-1.9	0.1	-0.2	0.0
meat	0.9	39.0	-4.4	-0.4	-0.2	0.0
cereals	-2.2	8.7	-3.8	-0.1	-0.1	0.0
ocr	-4.4	-6.2	-2.8	0.4	0.0	0.0
sugar	0.0	0.0	0.0	0.0	-0.1	0.0
ofp	-3.0	-3.3	-5.5	0.2	-0.1	-0.1
oprim	1.1	-1.3	1.7	-0.1	0.0	0.0
mnfcs	4.0	8.2	2.7	0.0	0.0	0.0
svces	-1.0	-3.0	-0.9	0.0	0.0	0.0
			change in market price (%)			
rmk	37.0	20.9	5.3	-4.3	-0.2	-0.1
dairy	11.9	10.2	2.1	-1.4	-0.1	-0.1
cattle	4.4	15.1	0.1	-0.5	-0.1	-0.1
oap.	-1.2	12.7	-0.8	0.0	-0.1	-0.1
meat	-2.1	8.4	7.5	-0.2	-0.1	0.0
cereals	-0.4	15.6	-1.1	0.1	-0.1	-0.1
ocr	-1.0	7.4	-1.1	0.2	-0.1	-0.1
sugar	-9.4	5.8	-4.0	-0.7	-0.1	-0.1
ofp	-1.1	5.5	3.7	0.0	-0.1	0.0
oprim	-0.3	1.9	-0.6	0.1	0.0	0.0
mnfcs	-1.6	0.5	0.5	0.1	0.0	0.0
svces	2.1	6.5	2.7	0.2	0.0	0.0
			change in quota rents (%)			
raw milk	27.7	9.1	-5.9	-4.5		
sugar	-9.4	-4.1	3.5	-0.8		

source: own calculations

Looking at the trade balance quite large effects can be observed for the agricultural products (see table 5). Here, the liberalization of the trade between old and new members leads to new trade flows. In sectors were the protection in the CEECs were comparatively higher than in the EU, like cereals and other crops as well as other animal products (including pork), imports are now increased. The opposite reaction can be shown for products were the protection is growing due to the enlargement, e.g. dairy, cattle, and meat. Although the absolute changes in manufactures and services seem to be rather high, they are not that important in relative terms due to the huge size of those sectors compared to agricultural and food production.

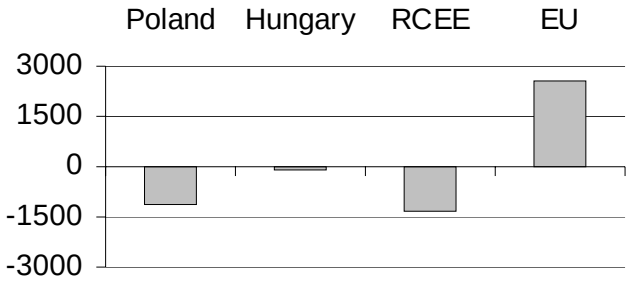
Table 5: Enlargement: Changes in Trade Balance (in million '97 US$)

	Poland	Hungary	RCEE	EU	MILK_EX	ROW
rmk	0	0	0	0	0	0
dairy	178	29	-101	-171	-77	-137
cattle	365	29	187	-579	-2	-41
oap	-123	-81	39	221	-2	-67
meat	142	698	-100	-723	-61	-90
cereals	-35	92	-50	-10	-15	-1
ocr	-169	-93	335	-4	-45	-206
sugar	0	0	0	0	0	0
ofp	-103	-69	997	-48	-409	-761
oprim	-65	-103	-120	-8	5	220
mnfcs	210	535	-105	38	1672	-3922
svces	-409	-1036	160	171	-1407	5013

source : own calculations

Figure 1 shows that concerning the net transfer the old EU members will gain from an enlargement. This result has to be seen of course in the context of our scenario, which does not include a transfer of direct payments into the CEECs. Furthermore the calculations do not include expenditures used for structural policy. Under this conditions the CEECs have to pay the GDP tax and a large share of their import tariffs to Brussels but receive only export and output subsidies. Nevertheless, while looking only at the redistribution of income within the framework of market and trade instruments, the old EU members are the winners of the accession.

Figure 1: Enlargement: Net transfer (in million '97 US$)

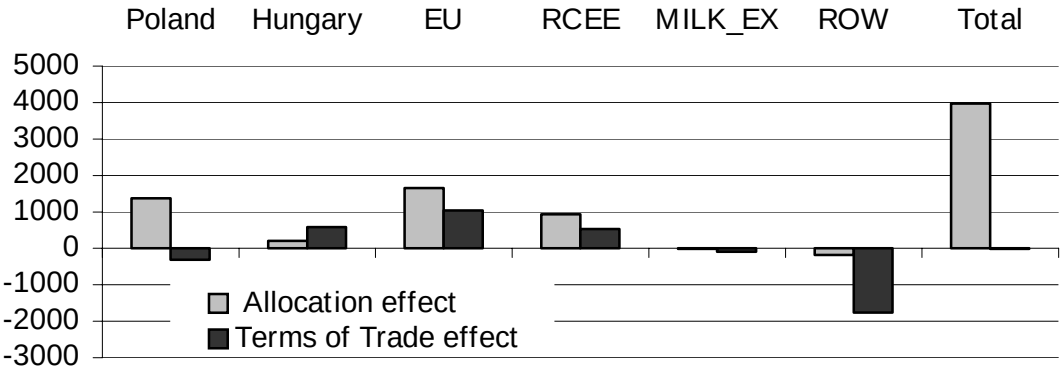


source: own calculations

The enlargement leads to an overall increase in welfare of 3957 million '97 US$ (see figure 2). This is induced by the removal of distortions between EU and the CEEC which allows for a better allocation of production factors. This effect is supported by the importance of trade between those regions. The greatest effects occur in the EU followed by Poland and the RCEE. The effects for the milk

exporting countries as well as the rest of the world are negative, but the overall impact is quite small. The terms of trade effect is influenced by the fact that the total trade balance is fixed in the model closure. While the EU, Hungary and the RCEE can improve their terms of trade Poland and ROW loose.

Figure 2: Enlargement: Changes in Welfare (in million '97 US$)



source: own calculations

5.2 Technical and Institutional Change

Due to the quota regime the introduction of technical progress in the raw milk sector of the CEECs (TECH1) has no effect on output and therefore leads only to a small decline in market prices and growing quota rents (see table 6). Hungary seems to be a special case: Here the drop in the market price for raw milk is quite high, this results in a remarkable increase in production of dairy products, followed by a decline in the market price. The changes for the EU-15 are negligible. In scenario TECH2 the effects are more pronounced. The dairy production in the CEECs experience a boost which even exceeds the implemented technical change rate. Therefore market prices for dairy are declining. The reactions of prices for raw milk differ between countries. They rise in Poland and RCEE and fall in Hungary. Again, the quota rents are going up. The dairy production in the old EU does not change significantly.

The technological change in combination with the quota system leads to a lower demand for endowments in raw milk production, thereby providing additional factors for other economic activities. In the dairy sector the situation varies between the countries and the scenarios. A lower dairy production uses less endowments, while higher output increases factor demand.

Table 6: Technical Change: Changes in Quantities, Prices and Quota Rents

	TECH 1				TECH 2			
	Hungary	Poland	RCEE	EU	Hungary	Poland	RCEE	EU

	change in quantities (%)							
rmk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
dairy	6.1	-0.2	0.9	0.0	24.2	18.5	19.3	-0.2
cattle	-0.6	1.1	0.3	-0.1	-0.4	-0.4	-0.1	0.1
oap	0.5	0.7	0.2	0.0	0.5	0.6	0.0	0.1
meat	0.4	0.6	0.3	0.0	0.4	0.4	0.3	0.1
cereals	0.0	-0.1	0.0	0.0	-0.1	-0.3	0.0	0.0
ocr	0.2	0.0	0.4	0.0	0.2	-0.2	0.5	0.0
sugar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ofp	0.0	0.3	0.1	0.0	0.1	0.3	0.2	0.0
oprim	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0
mnfcs	-0.2	-0.1	-0.1	0.0	-0.5	-0.5	-0.2	0.0
svces	0.1	0.1	0.1	0.0	0.2	0.3	0.2	0.0
	change in market price(%)							
rmk	-11.3	-0.1	-2.2	-0.3	-9.7	11.3	3.2	-4.9
dairy	-4.6	0.0	-0.9	-0.1	-18.6	-12.2	-14.5	-1.7
cattle	-0.5	-0.7	-0.6	0.0	-0.8	0.1	-0.3	-0.4
oap	-0.2	-0.7	-0.6	0.0	-0.3	-0.6	-0.2	-0.1
meat	-0.2	-0.3	-0.3	0.0	-0.2	-0.2	-0.1	-0.1
cereals	-0.4	-0.9	-0.5	0.0	-0.2	-0.5	-0.4	0.0
ocr	-0.2	-1.1	-0.5	0.0	-0.1	-0.9	-0.4	0.0
sugar	-0.4	2.8	1.1	0.2	0.0	4.0	2.5	1.5
ofp	0.0	-0.1	-0.1	0.0	0.0	0.1	0.0	0.0
oprim	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
mnfcs	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0
svces	0.1	0.1	0.0	0.0	0.2	0.3	0.1	0.0
	change in quota rent (%)							
raw milk	1.6	11.0	8.6	-0.3	2.9	20.0	13.1	-5.0
sugar	-0.1	3.7	1.5	0.2	0.2	4.7	2.7	1.5
source: own calculations								

Scenario TECH1 implies only small adjustments in the trade balance (see table 7). Generally, we observe an increase in the trade balances of new member states for most agricultural products and a decline in manufactures. Regions without technical progress show the opposite reaction. Stronger effects can be noticed in scenario TECH2, particulary in the dairy sector and manufactures. The trade balance of dairy increases for all new members and decreases in other regions. The opposite effects account for manufactures. Reactions in the other agricultural sectors vary between the countries according to the relative competitiveness of the sectors.

Table 7: Technical Change: Changes in Trade Balance (in million '97 US$)

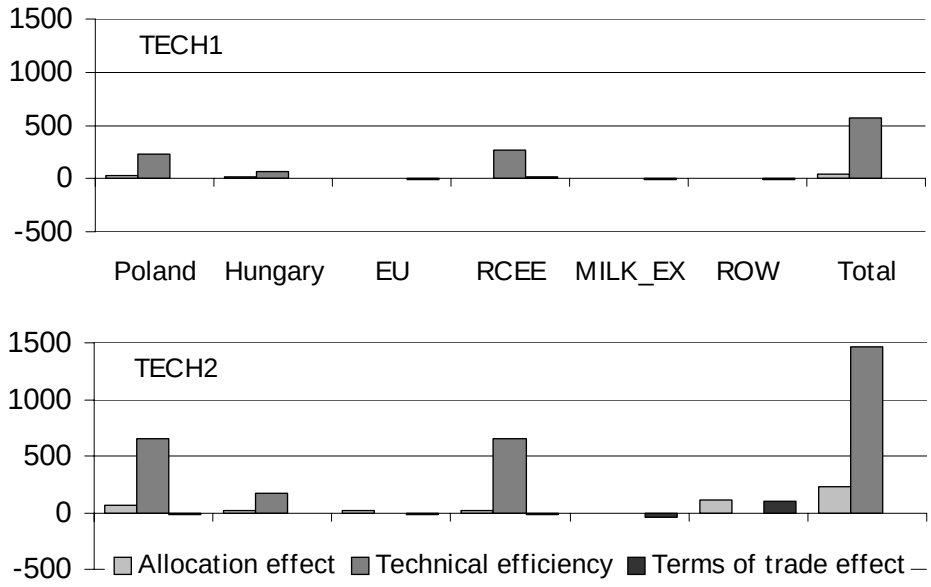
TECH1	TECH2

	HU	PO	RCEE	EU	MILK	ROW	HU	PL	RCEE	EU	MILK	ROW
rmk	0	0	0	0	0	0	0	0	0	0	0	0
dairy	25	-5	12	-14	-8	-12	90	321	287	-371	-136	-227
cattle	2	12	6	-17	0	-4	3	-11	-1	23	-1	-12
oap.	1	9	8	-12	0	-5	1	7	1	4	0	-13
meat	6	13	8	-16	-2	-9	4	1	-1	23	-2	-27
cereals	2	4	7	-7	-1	-4	1	2	6	-11	5	-3
ocr	1	29	15	-23	0	-20	-1	23	11	-40	6	0
sugar	0	0	0	0	0	0	0	0	0	0	0	0
ofp	3	9	10	-17	1	-6	0	-25	-8	24	12	-6
oprim	2	0	-4	-5	1	5	3	6	-4	-18	6	4
mnfcs	-60	-94	-136	140	12	138	-123	-347	-357	222	101	500
svces	-17	-28	-34	21	5	57	-38	-110	-80	49	43	185

source: own calculations

The results of scenario TECH1 show an increasing welfare in the CEECs, especially in Poland and in the RCEE, with minor changes in the other regions (see figure 3). The most dominant effect is, as expected, the growth in technical efficiency. A small rise in allocation efficiency can be observed in all regions, and the new members can slightly improve their terms of trade. The effects are quite similar in direction, but more explicit in scenario TECH2, with the exception of the main milk exporting countries where the allocation effect is now negative.

Figure 3: Technical Change: Changes in Welfare (in million '97 US$)



source: own calculations

The results can be summarised as follows:

- When the existing quota regime is expanded to the accession countries, the enlargement only leads to small adjustments in the milk and dairy sector of the EU-15 as well as in the milk exporting countries and the rest of the world. Major changes concerning prices and quantities can be expected within the accession countries, with the largest effects in Hungary and Poland.
- As long as direct payments are not transferred and structural aids are excluded, the old EU members can increase their net transfers from Brussels. Furthermore the enlargement will lead to an overall gain in welfare in the enlarged EU.
- With the exception of Hungary the introduction of technical change in the raw milk sector of the CEECs has only minor impacts, because of the applied quota regime. Due to the change in factor demand some effects can be observed in other sectors. Additional technical changes in the dairy industry induce a major increase in dairy production which is combined with an increase in trade flows.
- The gain in technical efficiency in the raw milk sector generates an increasing welfare in the accession countries. Additional technical change in the dairy sector will also improve the terms of trade and the allocation efficiency.

6 Qualifications

This paper is our first attempt to capture the effects of technical and institutional change in the milk and dairy sector in an enlarged EU. It leaves, however, space for additions and improvements. In the following we therefore like to discuss some major points:

Generally, the simulations could be improved by the implementation of exogenous projections concerning e.g. GDP, population and technical change in other sectors and regions. Due to the main focus of the paper we decided to exclude those developments, which will lead to further interactions between the sectors, and to concentrate on some main effects.

Some results for the CEECs, especially for Hungary, reflect extreme reactions in prices and quantities. Here the database should be carefully analyzed and maybe revised.

We have conducted the analysis at a highly aggregated level. Further disaggregation of other CEECs and the Baltic states in the GTAP database would be desirable to improve the results. There is some work underway financed by the EU commission which will single out the remaining acceding countries in the GTAP database. The inclusion of these countries in the analysis would be most interesting.

Additionally, the transfer of the CAP to CEESs could violate the Uruguay Round commitments of both the EU and the CEECs. Not all acceding countries have their commitments bound in hard currency like Poland had. Hungary and other CEECs

might face tight constraints because their value commitments in local currency have been eroded by inflation.We did not address these issue in our paper.
We have also not been able to deal with other important economic aspects of integration like the impact of investment flows from the EU 15 going into the CEECs which will result in a stronger output and productivity growth than predicted. Another one is the consideration of migration of labor from East to West and the appropriate treatment of factor markets in transition countries which needs the inclusion of labor rigidities and particularly unemployment to the model.
Technical and institutional changes can surely be modeled in a more sophisticated way, for example by distinguishing between changes in endowments, intermediates, and final products and by including region specific shocks.
Finally, the formulation of the enlargement scenario can be varied. Direct payments could be tranferred to the CEECs, the calculation of the budget effects could be expanded by including structural policy measures and new policies like region specific instruments could be evaluated.

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