

Crossing Borders – Labor Movement in an Enlarged EU

Marianne Kurzweil

German Federal Agricultural Research Center (FAL),
Institute for Market Analysis and Agricultural Trade Policy

Abstract

On the basis of a general equilibrium approach this study simultaneously analyses the impacts of an EU Eastern enlargement scenario on agricultural markets on the one hand and migration pattern on the other hand. The focus of the analysis is given to employment related effects of interregional labor movement. Thereby an in-depth analysis is provided concerning the coaction between trade liberalization and migration changes. For the quantitative assessment of this problem the Computable General Equilibrium (CGE) model GTAP (Global Trade Analysis Project) was applied. According to the requirements the model was extended by a novel approach for the depiction of migration in a CGE model.

Keywords: CGE, Migration, Labor Markets, EU Enlargement

1 Introduction

1.1 Problem statement

With regard to the forthcoming EU Eastern enlargement a lot of CGE studies aiming to assess the economic impacts have been carried out. Mostly the focus of those analyses was put on consequences for trade flows, production etc. But while the implications of the enlargement process on trade in goods are already discussed at length CGE based analysis concerning its impacts on interregional labor movement has proceeded much more slowly. In public discussion the expected impacts of the enlargement on east-west migration have been an important topic for a long time. Particularly immigration flows into Germany were often in the center of discussion since Germany represents the EU's main migration destination. Furthermore Germany has a long history with Eastern European workers being employed in German industries particularly in construction and in some specific agricultural sectors. In this context agriculture even plays a special role considering the significant differences between Germany's agricultural sector and

agriculture in the CEECs. While in the latter ones this sector still accounts for a high share of a country's GDP and employment share, in Germany's economy agriculture rather takes an underpart. Regarding the forthcoming heavy adjustments of Eastern agriculture to the EU's Common Agricultural Policy (CAP) major changes accompanied by strong impacts not only on agriculture itself but also on agricultural employment and income situation are likely to occur. On top of everything resulting from this high share of workers employed in agriculture it can be assumed that these expected adjustments lead to significant changes on the CEECs' labor markets in general. Obviously this connection between agriculture and the national employment situation is also reflected through interdependencies between the development of agricultural trade and production on the one hand and the development of migration flows on the other hand. With this background the purpose of this paper is to point out the coaction between agricultural trade liberalization and migration flows in the light of the EU enlargement process. For the quantitative assessment of this problem a Computable General Equilibrium (CGE) analysis was conducted with the Global Trade Analysis Project (GTAP) model. According to the requirements the model was extended by a novel approach for the depiction of migration in a CGE model.

1.2 Structure of the Paper

The subsequent chapter handles the methodological part providing a brief introduction to GTAP and a detailed explanation of the methodological extension of the model. In the third chapter the model design including data, aggregation strategy and shocks used for the enlargement experiment is explained. After the interpretation of the corresponding simulation results the paper ends with some concluding remarks and qualifications.

2 Theoretical Framework

With people migrating being an issue scientists are engaged in since a long time this topic already has also been considered in CGE modeling. In order to take into account the development of labor flows and their economic impacts in economic analysis there exist some

migration approaches in CGE models. Among others there are FRANCOIS and NELSON (1997) analyzing north-south migration in the context of a Mexico-US free trade area or BANSE (1998) who implemented rural-urban migration in a study assessing the impacts on employment in the course of an EU enlargement scenario. A documentation of literature concerning migration and CGE analysis is provided in KURZWEIL and BROCKMEIER (2003). The second and the third part of this chapter introduce the methodological instrument and its novel extended version used for an analysis of an EU enlargement scenario under the particular consideration of migration flows.

2.1 Standard GTAP model

GTAP is a comparative-static multi-regional CGE model. It 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 (ARMINGTON, 1969) 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. Usually policy interventions are represented by price wedges. They lead to different prices according to different market stages. Price differentiation adjusts via introduction or change of taxes and subsidies respectively. Quantitative restrictions or quantitatively induced price adjustments do not exist in the standard version. The framework of the standard GTAP model is well documented in the GTAP book (HERTEL, 1997) and available on the internet (<http://www.gtap.agecon.purdue.edu/>).

2.2 Extension of GTAP

The standard version of the GTAP model allows for the bilateral exchange of industrial and

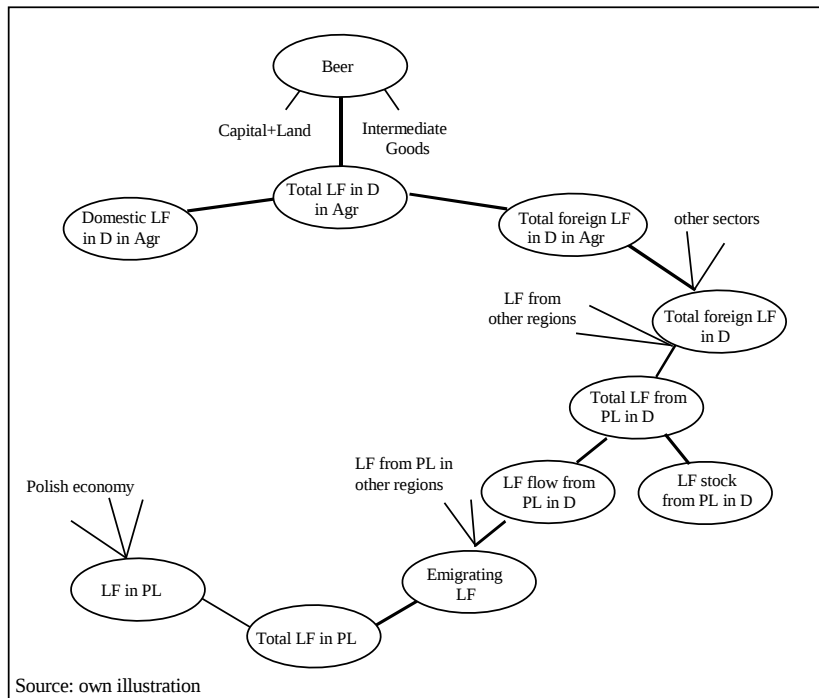
agricultural products as well as for trade in services. Thus, these components are not only demanded by domestic firms, private households and the government but also by foreign firms, private households and governments. However, in contrast to that the remaining input factors - capital, natural resources, land and also labor – are assumed to be regionally fixed. Since the following analysis aims to examine the impacts of the forthcoming EU enlargement on migration pattern and the interdependencies between agricultural trade and migration the model had to be adjusted according to those requirements.

In order to mimic migration the standard GTAP structure was modified in a way so that the extended model allows for bilateral movement of labor. Unlike to the standard GTAP model the factor labor is now able to cross borders and take part in the production process of foreign firms in different regions similar to production commodities. This migration mechanism generates a country's labor in- and outflow endogenously driven by the different regions' labor demand and supply, and the interregional wage differentials. Accordingly with the interregional differences in labor demand and wage level representing the driving forces of migration this way of modeling follows the classical migration theory inspired by Adam Smith and the approach of HARRIS and TODARO (1970).

For the implementation of this new feature the 'nested' production structure of the standard GTAP framework was expanded by an additional 'nest' (Figure 2.1). This component is responsible for the split-up of a country's total labor force into foreign workers on the one hand and domestic workers on the other hand. Thus, in contrast to the standard model firms do now have the possibility to employ both nationals as well as foreigners.

Figure 2.1 represents the basic mechanism regulating the distribution of workers across countries considering the situation of Polish workers employed in German agriculture as an example. At the bottom of the circle Poland's total labor force (total LF in PL) gets divided into workers who decide to stay in their home country (LF in PL) and get employed in the Polish economy, and on the other hand workers who decide to emigrate (emigrated LF flow).

Figure 2.1: Extended GTAP Production Structure



At that point the workers' decision making is regulated via a CET (Constant Elasticity of Transformation) function. In accordance with the Harris-Todaro theory the driving force of migration flows is the development of the different regions' wages. Thus, the corresponding parameters reflect the intensity of the workers' reactions to different developments of wage level across regions. This theory is supplemented by another assumption implying a certain influence of the development of unemployment in different regions. It is assumed that an increasing unemployment rate encourages migration out off the home country, while a decline in unemployment makes people rather stay in their home regions. The implementation of unemployment is conducted via an application of Okun's law, which states that there exists an inverse relationship between the development of a country's GDP and the country's unemployment rate.

Box 2.1: CET Function

$$X_{i,r} = (shr_{dom} * Y_{i,r}^{1/h-1} + shr_{for} * Z_{i,r}^{1/h-1})^{-1/(1/h)-1}$$

where

$X_{i,r}$	total labor force in r
shr_{dom}	share of domestic labor in r
$Y_{i,r}$	supply of domestic labor in r
shr_{for}	share of foreign labor in r
$Z_{i,r}$	supply of foreign labor in r
h	elasticity of transformation

The next decision the emigrated persons have to take is to choose their destination. According to this example one part of the emigrants moves to Germany (LF from PL in D) while the remaining migrants scatter across the other destinations (LF from PL in other regions). At this step a CES (Constant Elasticity of Substitution) function comes into play and determines the migrants' decision behavior. The elasticity of substitution ensures a distinction between the different nationalities of migrant workers and the resultant different preferences regarding the choice of a host country. A Polish worker for example might rather move to Germany than to the US even though the expected wage level is lower in Germany. The reason for such preferences can be found in social factors like geographical and cultural nearness, tradition etc. Besides the wage development the evolution of unemployment again plays an important role influencing the migrants' decision with an increasing unemployment rate in a potential host country lowering its attractiveness as migration destination. Together with the Polish community (LF stock from PL in D) already living in Germany the flow of Polish migrants (LF flow from PL in D) newly coming into Germany then adds up to the total pool of Polish labor force "available" in Germany (total LF from PL in D). Of course there are not only the Polish workers who have chosen Germany as their working destination. Thus, in Germany together with immigrants stemming from countries all over the world a pool of foreign labor emerges (total foreign LF in D). The German firms now have the opportunity to employ national or foreign workers. Since they are now spoiled for choice they have to take a decision concerning the domestic – foreign employee ratio in their production process. In the model the determination of this ratio is based on the Armington theory. Armington states that

firms and also private consumers distinguish between domestically produced and imported products as well as between commodities imported from different origins. The reasons for corresponding preferences can mainly be found in differences with respect to quality, inputs, production process etc. In the case of labor this kind of differentiation also applies whereas here the determining reasons might be interpreted as e.g. difficulties due to language problems, education, cultural background etc. Thus, the producers' decision taking is influenced by more or less the same factors like the decision process of the migrants described above. E.g. regarding the situation at hand a German farmer might on the one hand prefer a foreign worker because he accepts to work for less, but on the other hand may also have doubts due to communication or language problems. Regarding one step further ahead the producer is not totally indifferent among foreign employees either because they are all of different nationality so that employers might show preferences for workers with a similar cultural background in order to avoid disharmonies. Again, in the model structure this distinction is handled via a CES function including corresponding Armington parameter.

Box 2.2: CES Function

$$X_{i,j,s} = (shr_{dom} * Y_{i,j,r}^{1-1/h} + shr_{for} * Z_{i,j,r}^{1-1/h})^{1/(1-(1/h))}$$

where

$X_{i,j,r}$	total labor force in j in r
shr_{dom}	share of domestic labor in j in r
$Y_{i,j,r}$	supply of domestic labor in j in r
shr_{for}	share of foreign labor in j in r
$Z_{i,j,r}$	supply of foreign labor in j in r
h	elasticity of substitution

According to the resulting ratio the German workers represent the other part of the labor force employed in agriculture (Domestic LF in D in Agr). The remaining production decisions taken are conducted in the “old fashioned” CGE/GTAP manner. Together with land and capital labor flows into the production process and builds the value-added nest. The last step to the final product (here: beer) is the combination of value-added and other intermediate commodities.

Besides this main mechanism further extensions of the model framework comprise the

incorporation of seasonal workers and remittances. The seasonal workers were simply added to the already existing labor categories of skilled and unskilled labor differentiated in GTAP. Unlike to those two labor categories seasonal labor only finds consideration in specific sectors and countries. Thus, with respect to sectors seasonal workers are taken into account in the vegetables and fruits industry as well as in primary plant production and in the building sector. Regarding countries seasonal employment is only represented in regions showing a significant share of seasonal employees in the production processes of the mentioned sectors like Austria, France, Germany, Sweden and Switzerland. As already mentioned above the model extension also handles the interregional redistribution of remittances. Based on the figures obtained from the IMF (see Chapter 3) shares concerning the migrants' part of income that is sent back to their home country or spent in the host country, respectively, are calculated. In this manner it is possible to subtract the outgoing money from and add the incoming money on top of the regional and private household income.

3 Modeling EU Eastern Enlargement

With regard to the EU enlargement scenario the main purpose of this chapter is to provide an overview of the model design including an explanation of the data situation, scenario set-up, regional and sectoral aggregation.

3.1 Data

For the following simulations the GTAP data base version 5.1 with the base year 1997 was used. This version comprises 76 regions with all EU-15 member countries as well as all candidate countries being represented individually. Furthermore the database includes 57 sectors providing a very detailed picture of the agricultural sector. In the GTAP database the agricultural sector consists of 20 primary and 8 processed food sectors.

Since the GTAP database does not provide for any migration related information those data had to be collected from some other external sources. Data regarding the share of foreign workers in a country's total labor force, migration flows by home and host country and even

information about the migrants' skill level were obtained from the OECD, various national statistical institutions, the IMF etc. The shares of foreign workers according to sector were – at least for some countries - very well documented by the Labor Force Surveys of the ILO, Eurostat and IBV. Data with respect to remittance flows were exclusively collected at the IMF. The IMF's data base provides information about remittance flows by source and destination so that calculations concerning money being sent from one country to the other could be conducted quite accurately.

Nevertheless the data situation particularly with respect to the transition countries of Central and Eastern Europe imposes strong restrictions on modeling.

3.2 Aggregation

The aggregation strategy was dictated by two main requirements: On the one hand the selection of countries must allow for capturing relevant labor flows and on the other hand in order to keep calculation effort in a reasonable scope the aggregation must not exceed a certain size. Therefore all countries representing home regions of most of the immigrants coming to Germany are treated as single individual countries. Obviously Germany and Poland are among those single regions as well as several other CEECs, Turkey and the Former Soviet Union. The remaining countries are put together as aggregated regions either in the group representing the rest of EU-15 or comprising the rest of the CEECs respectively (see Figure 3.1).

Figure 3.1: Regional and Sectoral Aggregation

Regions		Sectors	
Germany	D	Primary Plant Products	plant
Poland	PL	Processed Plant Products	plantproc
Hungary	HUN	Vegetables and Fruits	vandf
Czech Republic	CZE	Animal Products	animal
Croatia	HRV	Processed Animal Products	aniproc
Slovakia	SVK	Other Food Products	oap
Rest of Former Sovjet Union	FSU	Construction	constr
Turkey	TUR	Primary Products	prim
Rest of EU-15	EU14	Manufactures	mnfcs
Denmark, Finland, Greece, Ireland, Portugal, United Kingdom, Spain, Austria, Italy, Belgium, France, Sweden, Netherlands, Luxembourg		Services	svces
Rest of CEECs	CAND6	Capital Goods	CGDS
Bulgaria, Estonia, Latvia, Romania, Slovenia, Lithuania			
Rest of the world	ROW		
Source: own illustration			

Concerning the sectoral aggregation the 57 industries included in the GTAP database were aggregated to 11 sectors comprising 6 agricultural sectors. Here aggregation was predominantly determined by a sector's relevance in terms of migrant workers' employment as well as with regard to a sector's labor-intensity. Since particularly Germany's vegetables and fruits and also the building sector account for major shares of (seasonal) foreign employees, both industries are represented as disaggregated sectors. In order to being able to observe differences regarding impacts on labor-intensive and less labor-intensive sectors agricultural production is split-up into primary production sectors on the one hand and processing production sectors on the other hand. With regard to calculation effort the same restriction applies like in the case of the regional aggregation. Thus, agricultural production is just represented in form of the main agricultural production categories plant and animal production (see Figure 3.1).

3.3 Scenario

The experiment at hand corresponds to a classical EU enlargement scenario. Various adjustments with regard to the countries' trade regime have taken place. In the first step all

trade distorting instruments, like tariffs and subsidies were fully abolished between the EU-15 and the candidate countries as well as among the CEECs themselves. Furthermore the CEECs' trade policy with respect to other third countries was adjusted to an EU level. Besides the trade related policy instruments output taxes and single-farm direct payments were adopted by the CEECs. Thereby the experiment considers a 100% adjustment to the EU-15 level of direct payments in the primary plant and animal as well as in the vegetables and fruits sector.

4 Results

Using this extended instrument one of the main purposes of this chapter is to demonstrate the new options of analysis arising through the novel features provided. With migration movements being generated endogenously the model now enables a simultaneous analysis of changes related to agricultural policies and labor market adjustments resulting from interregional labor movement. Another intention of this chapter is to point out the influence of the migration mechanism on simulation results, particularly with respect to labor market related aspects. Thus, the result representation is mainly concentrated on the enlargement's impacts on employment in general, differences regarding wage and employment situation of domestic and foreign workers etc. The most important aspect thereby examined is the coaction between agricultural policies and those labor market changes. In order to find out which policy interventions have the strongest influence on migration as well as on employment and wage level the results are decomposed and illuminated in greater detail. In order to handle the quantity of simulation results and to satisfy the necessary degree of detail at the same time the interpretation of employment and migration related aspects is restricted to only two regions – Poland and Germany.

Despite this primarily non-agricultural focus of the result interpretation a brief overview of the changes occurring in agricultural production, trade etc. is provided to facilitate classification of the labor related results at the beginning of this chapter.

Agriculture

As a result of the heavy trade liberalization trade performance of the EU-15 countries and the CEECs is subject to adjustment processes in every sector. Like Table 4.1 indicates all CEECs suffer due to a severe negative development of their trade balance, while the EU-15 benefits in this respect showing an increase in the overall trade balance. However, Germany itself experiences a trade balance loss. Looking at the trade balance of agricultural and non-agricultural commodities separately shows that some of the CEECs - Poland, the Czech Republic and Hungary - are able to strengthen their position in global agricultural trade. These three countries are able to post a significant increase in their trade balance. In contrast to that for the EU-15 agricultural trade accounts for a trade balance loss. The EU-15 owes its all in all positive development in trade balance to the trade in primaries and services. The reversed situation can be observed in the 3 CEECs mentioned above with the non-agricultural sectors shooting down the whole positive picture achieved in trade with agricultural goods.

Table 4.1: Change in Trade Balance after EU Enlargement (\$ US million)

Region Sector	D	EU14	PL	CZE	HUN	SVK	CAND6
plant	19.42	192.55	-281.17	-10.21	46.06	-20.94	-221.38
plantproc	50.66	144.00	307.69	370.45	197.89	3.55	-756.28
vandf	0.25	509.23	-350.46	-79.91	-124.60	-28.37	-247.12
animal	-59.72	-705.40	504.13	32.00	74.06	17.16	136.28
aniproc	-507.12	-1995.67	794.51	162.56	890.39	39.65	1095.38
oap	132.20	296.35	-299.73	-43.69	-196.84	-19.66	-148.88
total agr.	-364.31	-1558.94	674.97	431.20	886.96	-8.61	-142.00
constr	-18.11	152.55	-121.86	-73.96	-50.54	-38.32	-128.04
prim	618.38	1225.50	-1268.46	-566.32	-248.39	-122.46	-2224.12
mnfcs	-586.91	-200.68	-3171.69	1426.69	-734.26	424.45	-1775.95
svces	-339.03	2456.69	-1945.69	-1881.29	-1872.95	-639.88	-1726.38
TOTAL	-689.98	2075.12	-5832.73	-663.68	-2019.18	-384.82	-5996.49

Source: own calculation

In accordance with their changes in trade performance the different regions experience certain reactions in production output. In Germany and the EU-14 production shrinks particularly in the primary and processed animal sector, while in the CEECs production in those industries is

expanded in line with their booming trade performance. Like Table 4.2 shows this becomes particularly apparent in the case of Poland and Hungary.

Table 4.2: Change in Production Output after EU Enlargement (in %)

Region Product	D	EU14	PL	CZE	HUN	SVK	CAND6	HRV	FSU	TUR	ROW
plant	0.20	0.15	-1.44	1.01	3.69	-1.97	-3.17	0.00	0.63	0.09	0.00
plantpro	0.00	-0.10	3.07	10.45	8.84	2.67	-9.25	-2.41	0.02	-0.15	-0.06
vandf	0.59	1.31	-13.64	-7.21	-10.14	-7.78	-8.45	0.62	0.15	0.14	0.01
animal	-1.51	-2.19	17.58	3.86	22.21	3.08	2.44	0.08	-0.84	-0.09	-0.14
aniproc	-1.22	-1.04	12.59	4.02	35.27	4.08	20.21	-0.92	-1.44	-0.05	-0.19
oap	0.72	-0.12	-2.27	-0.02	6.15	-1.32	-3.35	1.06	0.37	1.12	0.02

Source: own calculation

This positive development can mainly be attributed to both countries' very competitive beef sector. What concerns Hungary the processed food stuffs industry keeps up with those expanding sectors by also experiencing a significant output increase. The main reason for the CEECs' expansion in the animal sectors can be found in the abolishment of the EU's formerly high import tariffs applied to those product categories. In the EU-15 only agricultural sectors formerly object to a low intervention level show increasing tendencies. This is the case for primary plant production and the vegetables and fruits sector. The pattern of protection also accounts for the divers picture concerning primary plant production sectors in the CEECs. With relatively high initial levels of protection and a low export performance in addition to the strong competition arising through the EU-15 countries some CEECs have to curtail their production. In contrast countries experiencing rather small tariff cuts because of a formerly low protection, like the Czech Republic or strong exporters, like Hungary are able to expand their production output. In processing plant production the changes are more significant in either direction. Particularly the Czech Republic and Hungary show very strong output expansions, while in the CAND6 region production declines by almost 10%.

Employment and Migration

Obviously with labor representing an input factor in the production process the development of the labor market situation tends to be strongly influenced by the performance of a country's

production sectors. Thus, in accordance with their production changes after the enlargement process the regions' demand for workers in the different sectors adjusts.

Table 4.3: Change in Germany's Demand for Labor after EU Enlargement (in %)

sector labor	plant	plantproc	vandf	animal	aniproc	oap	constr	prim	mnfcs	svces	CGDS
unskilled	0.19	0.01	0.59	-1.57	-1.20	0.72	0.19	1.20	0.02	0.00	0.41
skilled	0.19	0.02	0.59	-1.57	-1.20	0.72	0.20	1.20	0.02	0.01	0.41
seasonal	0.15	-0.17	0.55	-1.61	-1.39	0.68	-0.04	1.13	-0.19	-0.23	0.24

Source: own calculation

Table 4.3 pictures the case of Germany's change in demand for labor in the different sectors. Comparing the changes in labor demand and production output shows that there exists a quite linear relation between both variables; i.e. magnitude and direction of impacts on the input factor labor and the corresponding commodity/sector experience a parallel development. However, with less proportional relationships between labor demand and output change seasonal labor represents an exception in this respect. This becomes especially apparent in the case of the plant processing industry, since here a stagnating/faltering production output is accompanied by a decreasing demand for (seasonal) labor input.

Table 4.4: Change in Poland's Demand for Labor after EU Enlargement (in %)

sector labor	plant	plantproc	vandf	animal	aniproc	oap	constr	prim	mnfcs	svces	CGDS
unskilled	-2.60	3.36	-11.53	13.89	12.91	3.32	13.21	-10.63	3.01	-0.55	13.29
skilled	-2.47	3.97	-11.41	14.04	13.58	3.46	14.06	-10.44	3.70	0.19	13.89

Source: own calculation

In Poland this pattern looks very different from the situation in Germany with labor demand and output changes showing a quite disproportional development in several sectors. The animal processing sector represents the only sector with a relatively linear labor demand – production output evolution. All the other agricultural production sectors either experience heavy disproportional labor demand changes or – like the other food stuffs sector – even show an antidromic development of those two variables.

These different patterns across both countries are mainly caused by differing developments of prices for all primary factors in each industry and the corresponding shares labor takes in total value-added of the different sectors' production processes together with the relevant industry-

specific elasticity of substitution between land, labor and capital. Furthermore the assumption that there is no technical change taking place neither sector specific nor at the value-added stage represents another driving force of this development. With the application of this assumption the change in the composite demand for primary factors' input equals the change in production output. Thus, the higher the share of labor in total primary factors' input, the more parallel/ly correlated is the development of labor demand and the demand for total value-added and therewith for the commodity itself. In addition this positive correlation is even enhanced if the elasticity of substitution between primary factors is close to zero.

Transferring this to the actual state of affairs in Germany and Poland makes apparent that there exist significant differences between both countries in this respect. In Germany prices for land, labor and capital undergo rather modest changes, which range from -1.64% to 0.26% ; i.e. there is only a very modest fluctuation in place. Prices for natural resources underlie stronger impacts but since natural resources exclusively represent a production factor in the primary sector these price changes do not affect product or factor prices in any other industry. What concerns the share labor takes in German industries it can be stated that depending on the sector labor takes at least the second highest share in the production process. Thus, the overall demand development for primary production factors virtually equals the corresponding development for labor. Together with the assumption already mentioned above that with no technical progress the change in output equals composite input demand, this implies that the development in labor demand is equal to the changes in production output.

Looking at the same aspects in the Polish factor endowment situation represents a totally different picture. Here Poland's adoption of the EU's direct payments preponderates and heavily determines the development of factor input. The subsidies granted exclusively to land use in the primary plant production, vegetables and fruits and primary animal production sectors lead to severe distortions of factor usage with the demand for land in the relevant sectors reacting significantly more sensitive than the remaining input factors. This is caused by very severe deviations concerning changes in land prices compared to price changes of the

remaining input factors. Looking at the actual numbers this becomes quite apparent. While the wage changes range between 8.23 % and 8.81 %, the change in land prices stretches across values from –28.11 % up to 91.19 %. Since in Poland land still represents an input factor accounting for a high share in production processes, these high changes significantly affect the composite price for primary factors. Thus, this price distortion on the land market rubs off on the other factor markets, which is also reflected regarding the relation between output change and change in labor demand. With regard to the individual sectors the results show that the three sectors subject to the land subsidy experience a clear superproportional change in their labor demand. In contrast in the corresponding plant and animal processing industries labor demand increases less than the sectors' production output. This weak reaction results from a very low share of land use together with a relatively high elasticity of substitution between primary factors in both sectors. The last agricultural sector – the processed food stuffs industry – makes for a surprise indicating an antidromic development of production output and labor demand; while output declines by –2.27 %, the demand for labor increases by 3.32 % and 3.46 % respectively. The reason for this phenomenon is the tremendous land price increase in this sector, which leads to a substitution between land and labor. Consequently land usage is decreased for the benefit of labor.

Table 4.5: Change in Wages after EU Enlargement (in %)

sector labor	D	EU14	PL	CZE	HUN	SVK	CAND6	HRV	FSU	TUR	ROW
unskilled	0.24	-0.03	8.81	5.84	14.12	7.70	9.17	0.06	-0.40	-0.09	-0.20
skilled	0.23	-0.01	8.23	3.19	11.12	5.40	8.87	-0.05	-0.34	-0.07	-0.19
seasonal	2.22	2.06	-	-	-	-	-	-	-	-	-

Source: own calculation

With regard to wage development the importance of the agricultural sector and its role on the labor market in the different economies is reflected. Thus, with agriculture accounting for a very high employment share the improved demand situation influences the wage level which hereupon strongly increases in the CEECs. Like Table 4.5 indicates the wage situation in the EU-15 remains almost unchanged since here the agricultural sector is not big enough to have a real impact on the overall wage situation.

Besides the analysis of the general labor market developments the extended GTAP framework now allows for an insight into the processes occurring on the markets for domestic as well as for migrant labor.

Table 4.6: Change in Demand for Domestic and Foreign Labor after EU Enlargement (in %)

host sector	Change in Demand for Unskilled			
	Domestic Labor		Foreign Labor	
	D	PL	D	PL
plant	0.19	-2.60	0.17	-2.97
plantproc	0.01	3.36	-0.01	2.95
vandf	0.59	-11.53	0.57	-11.87
animal	-1.57	13.89	-1.59	13.45
aniproc	-1.20	12.91	-1.23	12.47
oap	0.72	3.32	0.70	2.92
constr	0.19	13.21	0.17	12.84
prim	1.20	-10.63	1.18	-10.92
mnfcs	0.02	3.01	0.00	2.67
svces	0.00	-0.55	-0.02	-0.93
CGDS	0.41	13.29	0.39	12.91

Source: own calculation

As the results presented in Table 4.6 indicate the employment development for domestic and migrant workers shows some differences. In Germany the changes in demand for domestic workers strongly correlate with the situation regarding the demand for foreign workers with basically every animal sector showing slight demand declines and some demand expansions in the primary plant and vegetables and fruits sector. However, even though the changes in demand show a parallel development sectors accounting for an increased labor demand post a stronger demand increase for domestic labor than for migrant labor, while sectors with an employment decline rather hire less foreign workers than reducing their stock of domestic workers.

Table 4.7: Change in Wages for Domestic and Foreign Labor after EU Enlargement (in %)

wage for \ region	D	PL
domestic labor	0.24	8.81
foreign labor	0.25	9.06

Source: own calculation

The reason for this hiring pattern can be found in the countries' wage developments (see Table 4.7). In Germany wages for foreign workers increase slightly stronger than the wage level for nationals. This is because in Germany the wage level for foreign workers is predominantly determined by the high share of migrants coming from the EU-14 and Turkey. Thus, even though wages for migrant workers from the CEECs increase by up to 0.66 %, the overall change in wage level for foreign workers is rather small.

Obviously in Poland the magnitude as well as the difference of impacts on both employment markets are more significant. For a better classification of these results it is necessary to mention that the initial migrant stock employed in Poland's economy is very small compared to foreign employment in Germany. Thus, even though relative changes might seem high the absolute change is still very small. Similar to the situation observed in Germany the demand for national workers rises stronger and decreases less than the demand for migrant workers. This can again be attributed to the stronger wage increase for migrant labor coming into Poland.

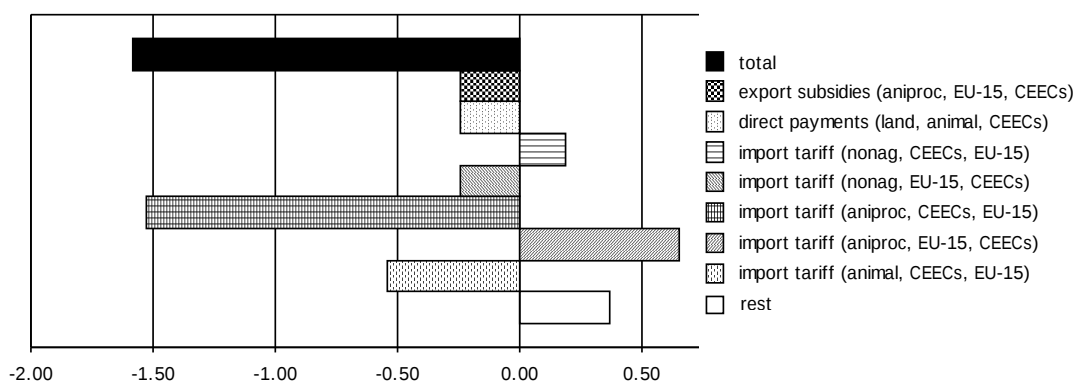
Interdependencies between agricultural policies and migration

As already previously explained the extended GTAP model allows for a direct analysis of interdependencies between policy interventions and migrant labor related aspects. Thus, in the following section some results are subject to a further in-depth analysis by decomposing them into their single components. A decomposition of the results demonstrates that in each region the policy changes cause impacts of different size and different direction. Furthermore the policy instruments responsible for the main effects differ across regions.

Referring to the results presented in the previous section the decomposition sheds light on for

example the reasons for the decline in demand for foreign labor in the German animal sector.

Figure 4.1: Change in Demand for Foreign Unskilled Labor in German Animal Production (%)¹



Source: own calculation

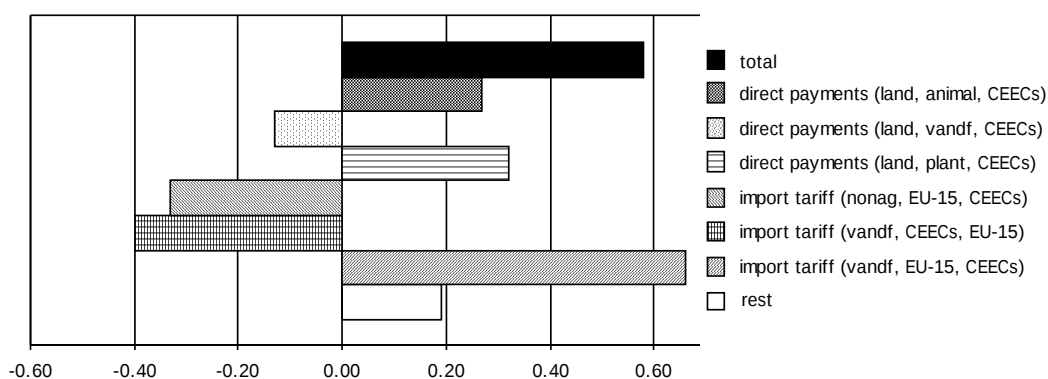
Like figure 4.1 indicates the cut of the EU-15's import tariffs applied on CEECs' processed animal product imports represents the driving force of this demand decline, while the tariff cut directly related to the primary animal industry only takes a back seat. The reason for this dominance of the changes in animal processing is the extremely high protection of this sector on the part of the EU-15. Since primary animal products account for a significant share in the processing industry's intermediate input composite, there exist strong interdependencies between both sectors. What concerns the reduction of import tariffs applied in the other direction; i.e. tariffs on products originating in the EU-15 imported into the CEECs, the effect on foreign labor demand in the corresponding sector in Germany is reversed and therewith demand increases. Other agricultural policy changes, which supplement the negative trend are the abolishment of the EU-15's export subsidies formerly granted on processed animal products shipped to the CEECs and the adoption of direct payments in the CEECs' primary animal sector. Furthermore figure 4.1 shows that the foreign labor demand in the primary animal sector is not only influenced by agricultural policy adjustments but also by changes concerning non-agricultural industries. Particularly the tariff cuts of both trading blocks regarding manufacturers influence foreign employment in the German primary animal

¹ Explanation of legend: The notation in brackets always refers to (sector, country of origin, country of destination).

production sector. This represents indirect impacts arising through economy-wide allocation effects.

In contrast to animal production the demand for foreign labor in Germany's vegetables and fruits sector slightly increases. As figure 4.2 shows the CEECs' tariff cut against EU-15 vegetable imports heavily determines this result. In addition the new member countries' adoption of EU-15 direct payments in animal and plant production even enhance this development. This again represents an indirect effect caused by economy-wide allocation of production factors from less profitable to booming sectors. Since the direct payments granted to the plant and animal industry are much higher than the payments flowing into the vegetables and fruits sector itself, this sector suffers in the battle for inputs. Thus, Germany's and also the rest of the EU's vegetables and fruits sector benefit from this situation, expand production and at the same time also are in need of more foreign labor.

Figure 4.2: Change in Demand for Foreign Unskilled Labor in German Vegetables and Fruits Production (%)¹



Source: own calculation

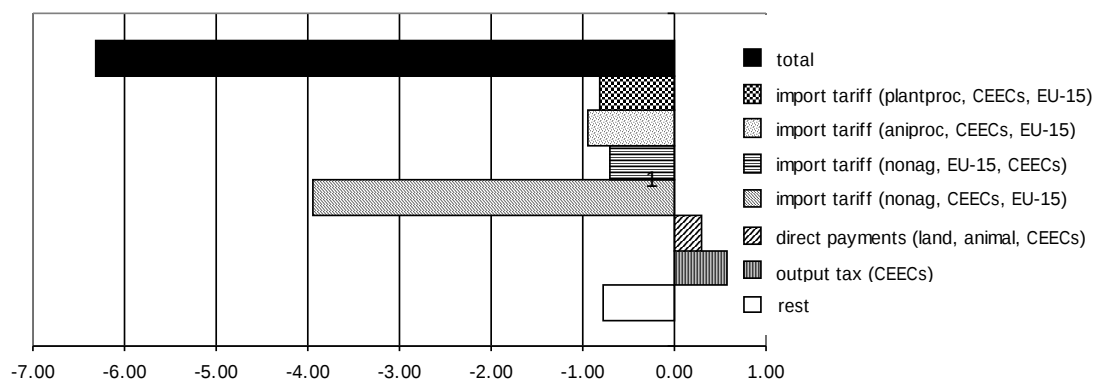
Accordingly policy interventions supporting the CEECs' vegetables and fruits industry, like the abolishment of the EU-15's import tariffs as well as direct payments, influence this development in the opposite direction. Allocational effects on the German economy's side become apparent regarding the CEECs' cut of import tariffs subject to EU non-agricultural imports. Resulting from market and production expansions in the manufacturing industry, this policy change leads to a strong decline in foreign labor demand in the German vegetables and fruits sector. Production factors along with foreign workers are drawn from the vegetables and

fruits sector for the benefit of the booming manufacturing industry.

Besides the direct labor market effects of foreign employment, the main determinants of migration flows can be analyzed.

For example on the basis of the decompositions represented in figure 4.3 and 4.4 it can be observed that labor movements from Poland to Germany and from the Czech Republic to Germany are differently influenced by the policy interventions. Migration flows in both directions decline by approximately the same magnitude. A further commonness is that the policy change dominating the migration decline most is the abolishment of EU import tariffs applied to non-agricultural commodities imported from the CEECs. The individual industry driving this development is the manufacturing sector since this is the only non-agricultural sector, which is still subject to a relatively high import protection on the part of the EU. Regarding this result in a relative sense shows that this policy intervention plays a more important role concerning the migrant flow coming from the Czech Republic than the movements out off Poland. The reason for this difference is that the share of workers being employed in the manufacturing industry is greater in the Czech Republic than in Poland. With regard to the remaining policy changes the effects in Poland and the Czech Republic differ.

Figure 4.3: Change in Unskilled Labor Migration from Poland to Germany (%)¹

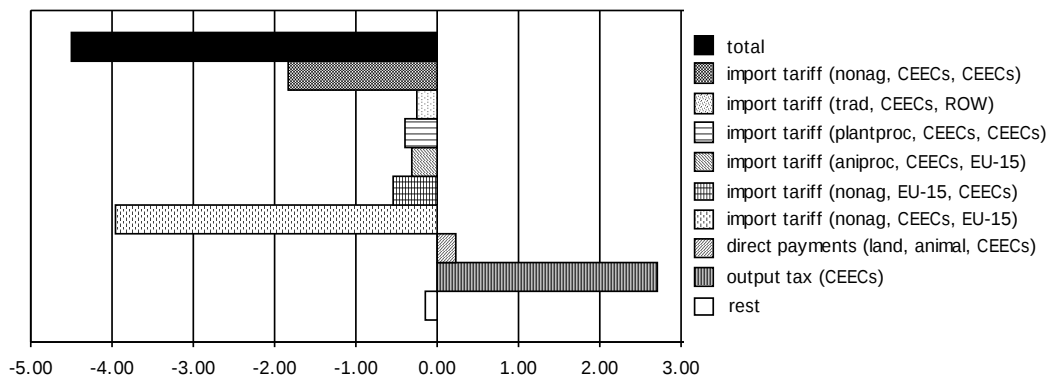


Source: own calculation

The abolishment of Poland's import tariffs against non-agricultural products from the EU-15 also significantly slows down migration movements to Germany. Besides trade liberalization

for non-agricultural commodities the agricultural policy change also heavily determines this migration behavior. Particularly the cut of the EU-15's import tariffs applied on processed agricultural products, like processed plant and animal products, makes migrating less attractive for Polish workers. In both sectors employment of national workers increases. Nevertheless, there are also some policy interventions, which weaken the migration downward trend. The change in Poland's output tax as well as the adoption of the EU-15's direct payments in animal production act as a stimulant on people's migration incentive.

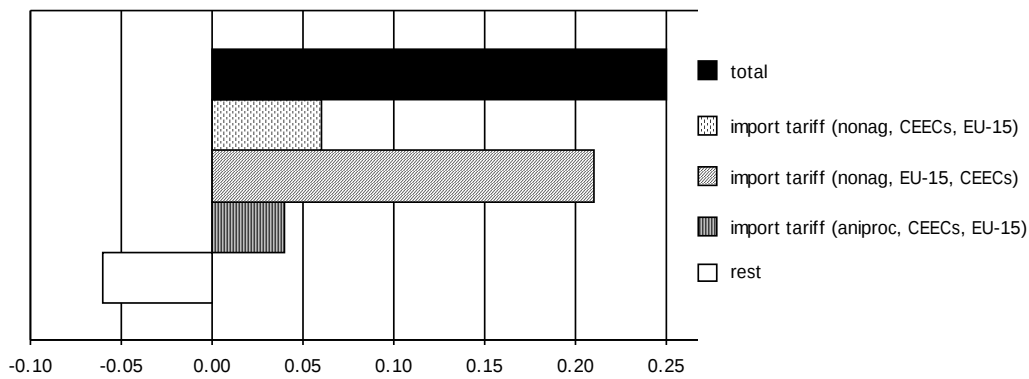
Figure 4.4: Change in Unskilled Labor Migration from Czech Republic to Germany (%)¹



Source: own calculation

The policy intervention accounting for the second largest impact on migration movements from the Czech Republic to Germany is the abolishment of non-agricultural import tariffs among the CEECs themselves (see figure 4.4). Similar to the situation observed in Poland the cut of the CEECs' import tariffs of non-agricultural commodities applied against imports from the EU-15 also makes people rather stay at home than to emigrate. What concerns agricultural policy interventions the picture again equals the Polish situation with the trade liberalization in the plant and animal processing industry leading to a decline in migration flows from the Czech Republic to Germany while the adoption of the EU-15's direct payments particularly in the animal sector represents a positive migration incentive. A very severe positive influence on labor movement can be attributed to the adjustment of the Czech output taxes to an EU-15 level. This policy change causes an increase of migration flows from the Czech Republic to Germany of almost 3%.

Figure 4.5: Change in Unskilled Labor Migration from the EU-14 to Germany (%)¹



Source: own calculation

In order to underline the differences in migration developments among regions which are characterized by a different economic importance of the agricultural sector, beside migration inflows from Poland and the Czech Republic this chapter also considers inflows from the rest of the EU into Germany. As figure 4.5 indicates migration flows of unskilled workers moving from the EU-14 into Germany slightly increase. The driving forces of this development are definitely the policy interventions associated with trade in non-agricultural commodities, like the abolishment of import tariffs in either direction. Agricultural trade liberalization or other CAP related measures rather play an underpart. The cut in the EU-15's import tariffs applied on the CEECs' processed animal products represents the only agricultural policy change, which shows at least some minor influence on the simulation result. Compared to the pattern depicted in figures 4.3 and 4.4 the decomposition reflects the average low employment share of agriculture and the sector's overall rather small economic relevance in the countries of the EU-15.

5 Conclusion

The results show that the enlargement process heavily affects agricultural trade. This is because before the enlargement the protection applying to the agricultural sector was much higher than for other sectors like manufacturers or services. Since agriculture still represents an important economic sector in the CEECs the impacts for those countries are very significant while the effects in the EU-15 states are less strong. This pattern also applies to the

labor market situation in Germany and Poland. With some exceptions labor demand remains more or less unchanged in the German (agricultural) sectors whereas this is the case regarding the demand for domestic as well as for foreign workers. The reason for this parallel development is the relatively meager share of migrant workers in agriculture combined with the generally low labor demand adjustments in Germany. With respect to the situation in Poland significant increases in the demand for foreign as well as for domestic workers can be observed. The strong demand increase is accompanied by a very significant rise in wage levels.

The decomposition of the total results into their single components illuminates that migration related aspects, like the change in demand for foreign labor in Germany as well as migration behavior itself is strongly determined by (agricultural) trade policy interventions. However, the results differ with respect to strength of each policy's impact on the results. With regard to migration flows from Poland and the Czech Republic to Germany the agricultural policy changes – next to non-agricultural policy changes - play an important role and significantly influence the results. In contrast labor movements from the EU-14 to Germany are almost exclusively determined by non-agricultural policy interventions.

In general what concerns the interdependencies between trade policies and CAP instruments on the one hand, and migration on the other hand, it can be stated that the abolishment of import tariffs yields the strongest impacts on migration behavior, while the cut or adjustment of export subsidies causes rather marginal changes. The adoption of the EU's direct payments as well as the adjustment of output subsidies also represent relevant influencing factors for migration developments.

The different pattern across regions points out that these interdependencies strongly depend on the role of the agricultural sector in a country's economy and also employment situation. For this reason the interdependencies are very strong in the CEECs because here the agricultural trade liberalization leads to significant employment changes, which then directly determine migration behavior. Germany and the EU-14 are rather passively affected; i.e. the

real impacts directly occur in the CEECs but spill over – albeit weakened - into the EU-15.

6 Qualifications

In a quantitative analysis it is a very difficult task to depict any qualitative circumstances. With regard to the migration topic this becomes particularly apparent when it comes to the representation of migration restrictions. Those restrictions mostly exist in form of certain bureaucratic procedures, special requirements a potential immigrant has to fulfill etc. Due to a lack of quantitative estimations of such rules and formalities, migration restrictions are not considered in the study at hand. This short-coming has to be kept in mind when looking at the results because for the analysis the assumption of free movement of labor applies.

Furthermore data availability imposes major problems on the modeling opportunities. Data collection regarding the share of foreign workers in a country's labor force, migration flows by home and host country etc. turned out to be particularly difficult for the CEECs. Due to this lack of data it has to be mentioned that some simulation results may be distorted. Besides the availability of base data another difficult task was the introduction of adequate parameters. Since migration has never been estimated via the Armington approach before there exist no corresponding parameters reflecting the elasticity of substitution between domestic and foreign labor in the literature. Thus, for the experiment at hand the Armington parameters are based on income migration elasticities. Further research demand is also necessary in terms of the consideration of technological progress and therewith the development and/or advance of labor-saving production processes particularly with regard to transition countries. Last but not least especially in the case of Germany it is essential to further focus on the characteristics of the very complex social security system and its interactions with migration behavior.

7 References

ARMINGTON, P. (1969): A Theory of Demand for Products Distinguished by Place of Origin. International Monetary Fund Staff Papers, vol. 16, p. 159-178.

- BANSE, M. (1998): The Impact of EU-Accession on Agricultural Employment in Slovenia and Poland – A CGE Model Approach.
- FRANCOIS, J.; NELSON, D. (1997): Population Growth, Trade Policy and North-South Migration. Paper presented at a CEPR workshop on dynamic issues in applied commercial policy analysis. CEPR Discussion Paper, vol. 1560. London.
- HARRIS, J.R; TODARO, M.P. (1970): Migration, Unemployment and Development: A Two-Sector Analysis. American Economic Review, vol. 60, p. 126-142.
- HERTEL, T.W. (1997): Global Trade Analysis – Modeling and Applications. Cambridge: University Press.
- KURZWEIL, M. (2004): Labor Migration and Agricultural Trade Liberalization. In: Jahrestagung der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues. pp 12 [Konferenzbeitrag; Manuskript].
- KURZWEIL, M. and BROCKMEIER, M. (2003): EU Migration in the Context of Liberalizing Agricultural Markets. Paper presented at the Annual Meeting of the American Agricultural Economics Association. Montreal, Canada, 27. – 30.07.2003.
- OECD (2001), Trends in International Migration. Continuous Reporting System on Migration. Annual Report.