



FIW Research Report N° 005 / Export of Services  
June 2008

## Trade Effects of Service Liberalization in the EU – Simulation of Regional Macroeconomic Effects for Austria

Fritz, O., Streicher, G.

---

### Abstract

---

Based on simulations with a computable general equilibrium model the impacts of service liberalization policies on trade flows were estimated by wiiw. Given these trade effects resulting changes in value added and employment on a regional level were simulated using a multiregional multisectoral model for Austria (MultiREG). Because net exports changed very little, the impact of trade liberalization policies on the Austrian value added turned out to be rather small: While in the short run value added declines somewhat, the impact is positive in the long run; value added, however, increases only by 0.3 percent.

---

The FIW Research Reports show the results of the three thematic work packages 'Export of Services', 'Foreign Direct Investment' and 'Competitiveness', that were commissioned by the Austrian Federal Ministry of Economics and Labour (BMWA) within the framework of the 'Research Centre International Economics' in November 2006.

**WIFO**

A-1103 WIEN, POSTFACH 91  
TEL. 798 26 01 • FAX 798 93 86

 **ÖSTERREICHISCHES INSTITUT FÜR  
WIRTSCHAFTSFORSCHUNG**

**Trade Effects of Service Liberalization  
in the EU**

**Simulation of Regional Macroeconomic  
Effects for Austria**

**Oliver Fritz (WIFO),  
Gerhard Streicher (Joanneum Research)**

Projektkoordination: Yvonne Wolfmayr, Irene Langer

**April 2008**

# **Trade Effects of Service Liberalization in the EU**

## **Simulation of Regional Macroeconomic Effects for Austria**

**Oliver Fritz (WIFO),  
Gerhard Streicher (Joanneum Research)**

Studie des Österreichischen Instituts für Wirtschaftsforschung  
im Auftrag des Bundesministeriums für Wirtschaft und Arbeit

Arbeitspaket N°1 Dienstleistungsexport: Modul 3,  
Teilmodul 3.2

Begutachtung: Fritz Breuss

Projektkoordination: Yvonne Wolfmayr, Irene Langer

April 2008

# Trade Effects of Service Liberalization in the EU – Simulation of Regional Macroeconomic Effects for Austria

Contents	Page
Das Wichtigste in Kürze	1
1. Introduction	5
2. <i>MultiREG</i> – a multiregional multisectoral model for Austria	7
3. The regional macroeconomic effects – simulation results	9
4. References	13
5. Appendix	15



# Trade Effects of Service Liberalization in the EU – Simulation of Regional Macroeconomic Effects for Austria

Oliver Fritz (WIFO), Gerhard Streicher (Joanneum Research)

## Das Wichtigste in Kürze

In einer mit einem allgemeinen Gleichgewichtsmodell durchgeführten Simulation des wiiw wurden die Handelseffekte einer Liberalisierung im Dienstleistungsbereich geschätzt (Francois – Pindyuk - Wörz, 2008). Übersicht 1 gibt einen Überblick über die dabei berechneten Effekte nach Gütergruppen.

Ausgehend von diesen Handelseffekten wurden die makroökonomischen Wirkungen, d. h. die resultierende Veränderung der Bruttowertschöpfung und der Beschäftigung auf regionaler Ebene mit Hilfe des multiregionalen multisektoralen Modells *MultiREG* berechnet. Wie aufgrund der geringen Veränderung in den Nettoexporten zu erwarten, ist der Einfluss der Handelsliberalisierungen auf die österreichische Bruttowertschöpfung eher klein: Während es in der kurzen Frist zu einem geringfügigen Rückgang kommt, ist der Effekt langfristig zwar positiv, hält sich mit 0,3% aber in Grenzen.

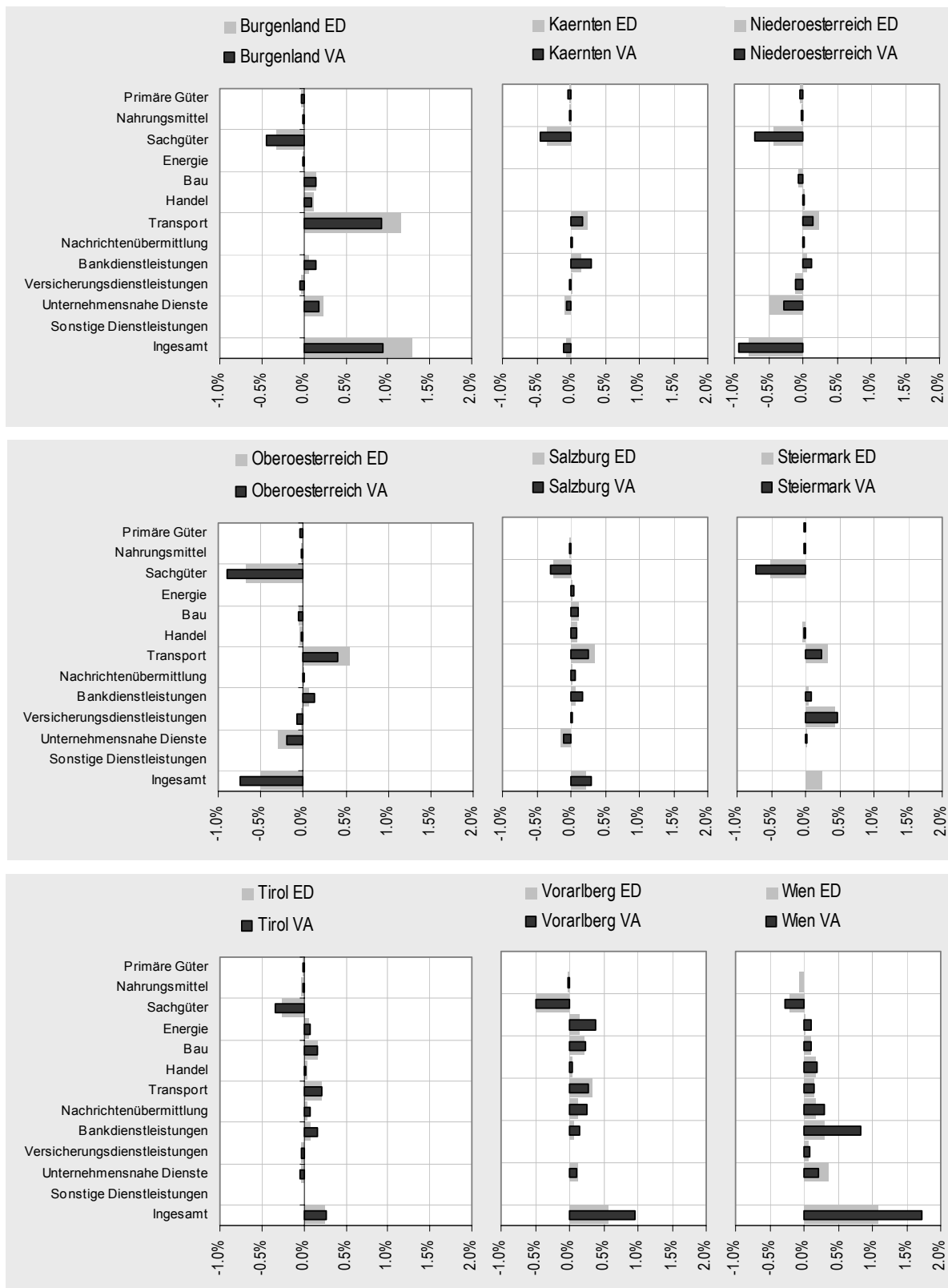
Aus regionaler Sicht lassen sich recht deutliche Unterschiede in den Effekten erkennen, die vor allem unterschiedliche Branchenspezialisierungen zwischen den Bundesländern widerspiegeln: Sachgüterorientierte Bundesländer wie Ober- und Niederösterreich gehören zu den Regionen, die (insbesondere in der kurzen Frist) Nachteile aus der Liberalisierung erleiden, während dienstleistungsorientierte Bundesländer, allen voran Wien, davon profitieren. Die regionalen Effekte nach Branchen sind der Abbildung 1 zu entnehmen, während Abbildung 2 die sektoralen Effekte auf nationaler Ebene zeigt.

Übersicht 1: Handelsliberalisierung im Dienstleistungsbereich: Güteranteile an Exporten und Importen und %-Abweichung vom CGE-Basisszenario

Gütergruppen	IOT 2003 - Struktur		Kurzfristige Effekte		Langfristige Effekte	
	Exporte	Importe	Exporte	Importe	Exporte	Importe
Primäre Güter	1%	6%	-0,4	-1,0	-0,5	0,2
Nahrungsmittel	4%	4%	-1,0	1,0	-0,9	1,9
Sachgüter	72%	76%	-3,2	0,9	-2,6	1,4
Energie	2%	1%	18,9	17,3	19,1	18,6
Bau	1%	1%	55,0	60,8	54,6	62,6
Handel	6%	1%	16,6	17,3	17,6	17,5
Transport	5%	2%	19,8	12,0	20,4	12,5
Nachrichtenübermittlung	1%	0%	57,4	7,3	58,4	8,1
Bankdienstleistungen	3%	1%	34,5	2,6	37,6	3,1
Versicherungsdienstleistungen	1%	0%	35,8	7,1	39,2	8,5
Unternehmensnahe Dienste	5%	4%	8,0	11,4	10,4	10,7
Sonstige Dienstleistungen	0%	2%	11,3	17,0	13,3	16,9
Insgesamt	100%	100%	4,0	4,6	4,9	4,9

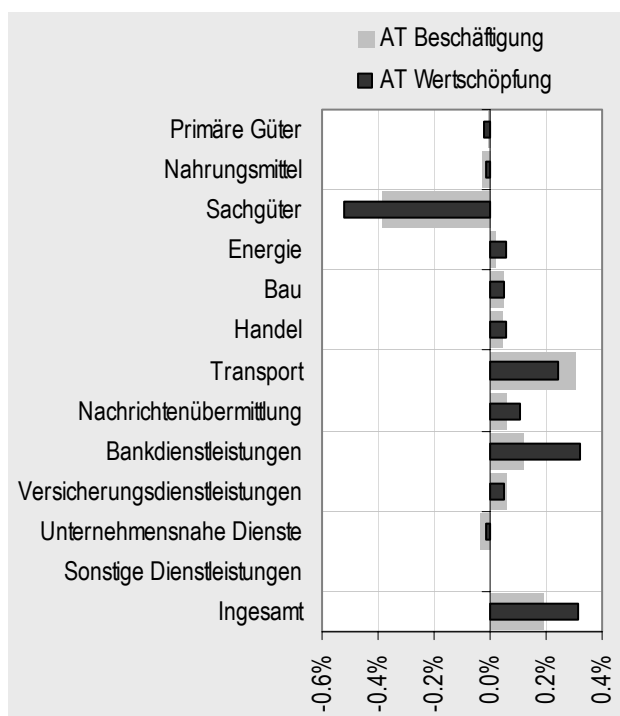
Q: wiiw.

Abbildung 1: Langfristige sektorale Effekte (Bruttowertschöpfung, Beschäftigung) nach Bundesländern



Q: wiiw.

Abbildung 2: Langfristige sektorale Effekte (Bruttowertschöpfung, Beschäftigung) für Österreich



Q: wiiv.





## 1. Introduction

In a separate research paper, *Francois – Pindyuk - Wörz* (2008) analyze the quantitative effects of different trade liberalization scenarios on exports and imports for a host of countries. Based on their results the aim of this paper is to estimate the macroeconomic consequences of the trade effects on a regional level for Austria.

The analysis as a whole is thus a combined application of two quite distinct model types: a computable general equilibrium (CGE) model was used to estimate the international trade effects of different liberalization regimes; the results from this analysis with respect to changes in exports and imports were then fed into a regional econometric input-output model (*MultiREG*) to explore in more detail the regional macroeconomic consequences. The analysis thus concentrates on regionalizing the trade effects as simulated in the CGE-model. These trade effects are treated as given – a *MultiREG* analysis with endogenous trade (i.e. endogenous import reactions, since exports are exogenous in the current model version) would probably have lead to somewhat different overall effects without changing the results substantially. These differences are therefore not explored any further in this report.

Before presenting the results of the regional simulation exercises a short description of *MultiREG* is provided in the following section of the paper.



## **2. MultiREG – a multiregional multisectoral model for Austria**

Since Austria is a rather small country and its economy thus very open, attempts to move from the national to a regional level of macroeconomic modelling are not only hampered by severe data restrictions but also by the fact that Austrian regions are characterized by an extremely high degree of openness. This limits the usefulness of single region models since economic impacts from changes in economic policy or public investment projects mostly emerge not within the region where these policies or projects are implemented but in other Austrian regions. In addition single region models are often top-down-type models where changes in regional economic activity (employment, output, consumption etc.) are derived from changes in the corresponding national variables. In modelling larger regions, e.g. the metropolitan region of Vienna, which accounts for almost 20 percent of the Austrian population, simultaneity thus becomes more and more problematic. Therefore, after having completed two single region models for the provinces of Styria and Upper Austria (*Fritz et al.*, 2001; *Zakarias et al.*, 2002), an attempt to bring all nine Austrian provinces into one multiregional model was undertaken.

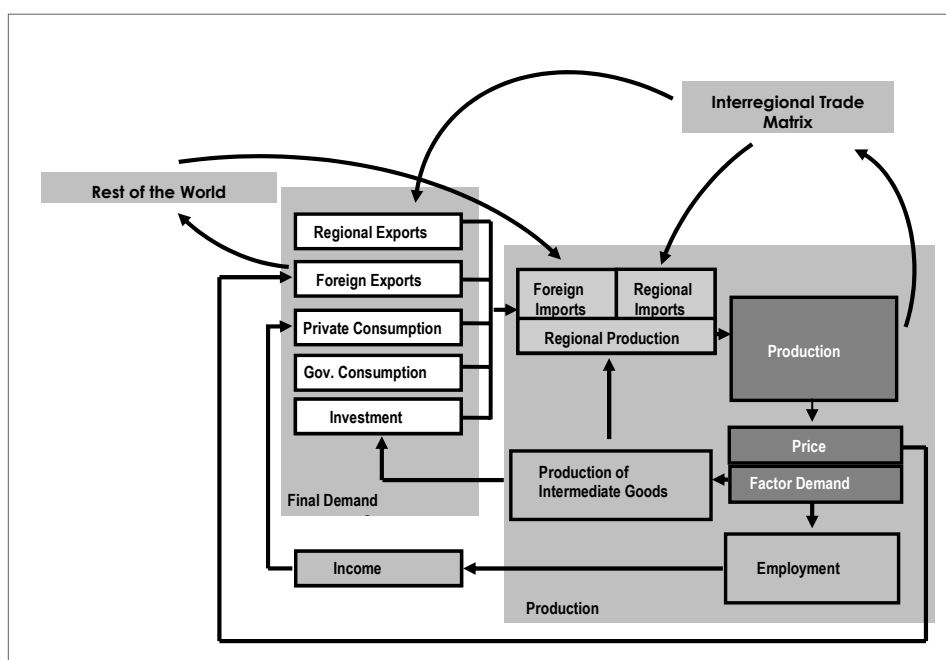
*MultiREG* integrates two model types, econometric models and input-output models, at the multiregional scale; a first and preliminary version has just been completed and is now undergoing extensive testing. The aim of building an integrated model is to benefit from the advantages of either model type and remedy their respective shortcomings. Integrating econometric and input-output models draws its motivation both from theoretical as well as practical aspects (*Rey*, 2000): for instance, instead of applying the linear production technology assumption of the standard input-output model, more flexible production functions may be estimated and included in integrated models. Similarly, instead of assuming final demand to be exogenous as is often the case in a pure input-output framework a more theoretically sound treatment of private consumption, investment etc. can be achieved when an econometric modelling approach is applied. A high degree of industrial disaggregation (*MultiREG* comprises 32 industries, see also the Appendix), on the other hand, is often put forward as one of the main advantages of input-output models; this becomes especially important when the model is to be applied for impact analysis.

While the single-region models for Styria and Upper Austria were built very much in the tradition of Conway's integrated regional econometric input-output model (*Conway*, 1990), the modelling approach taken in *MultiREG* is closer to the one implemented in MULTIMAC

(Kratena, 1994; Kratena - Zakarias, 2001), which in turn was developed along the lines of the INFORUM model family (Almon, 1991) and the European multiregional model E3ME (Barker et al., 1999). This implies that compared to its predecessors *MultiREG* not only replaces the single-region framework with a multiregional setting but relies to a much greater extent on functional forms consistent with microeconomic theory instead of pure statistically-driven variable relationships.

*MultiREG*'s model structure is illustrated in Figure 1. A simple description of the model's solution algorithm may start out with total final demand, which is composed of private and public consumption, investment, and regional and foreign exports. This demand can be met either by importing commodities from other regions or abroad or by commodities produced by regional firms. While foreign imports (and exports) are still exogenously determined in the first version of the model but will later be modelled separately, regional imports (and exports) are established in the interregional trade block. Regional production is simulated in the output block, where output prices and factor demand are derived based on cost functions. Factor demand consists of intermediate inputs (which feed back to total regional demand) and labour. By generating income, labour influences final demand. Another feedback channel will operate via output prices, since changing relative prices lead to changes in the demand for foreign exports (and foreign imports). Finally, changing regional production patterns also lead to changes in regional trade patterns.

Figure 1: The structure of *MultiREG*



### 3. The regional macroeconomic effects – simulation results

The CGE-simulations of trade liberalizations resulted in the following relative changes to exports and imports in Austria:

Table 1: Removing barriers to trade in services: shares of commodities in total exports and imports and % deviations from CGE-baseline results

Commodities	IOT 2003 - structure		short-run effects:		long-run effects:	
	Exports	Imports	Exports	Imports	Exports	Imports
Primary production	1%	6%	-0.4	-1.0	-0.5	0.2
Processed foods	4%	4%	-1.0	1.0	-0.9	1.9
Manufacturing	72%	76%	-3.2	0.9	-2.6	1.4
Utilities	2%	1%	18.9	17.3	19.1	18.6
Construction	1%	1%	55.0	60.8	54.6	62.6
Trade	6%	1%	16.6	17.3	17.6	17.5
Transport	5%	2%	19.8	12.0	20.4	12.5
Communication	1%	0%	57.4	7.3	58.4	8.1
Financial services nec	3%	1%	34.5	2.6	37.6	3.1
Insurance	1%	0%	35.8	7.1	39.2	8.5
Business services nec	5%	4%	8.0	11.4	10.4	10.7
Other services	0%	2%	11.3	17.0	13.3	16.9
total	100%	100%	4.0	4.6	4.9	4.9

Source: wiiw.

Although for some commodities, the simulated percentage changes look dramatic (exports are reckoned to expand by 60 percent in the case of construction and communication!), the changes to total exports and imports are moderate; this is due to the fact that those dramatic changes affect commodities whose share in total trade is low. The changes in manufactured goods, with close to three fourths of all exports and imports the most important group by far, are moderate: exports should contract by some 2½ percent, while imports rise by 1½ percent. Moreover, in the long run (i.e., allowing for adaptations in the stock of capital), the net effect in external trade is almost zero (in the short run, imports rise somewhat faster than exports).

On the basis of these results, i.e. the changes in sectoral exports and imports, the multi-regional input-output model *MultiREG* was used to estimate the effects of these changes to gross domestic product GDP and its regional counterpart, GRP.

As was to be expected from the small changes in net exports, the effect on the Austrian GDP is only marginal: in the short run, GDP is estimated to contract by –0.3 percent; in the long run, the effect is identical in size, but positive. Regional effects are quite differentiated and reflect

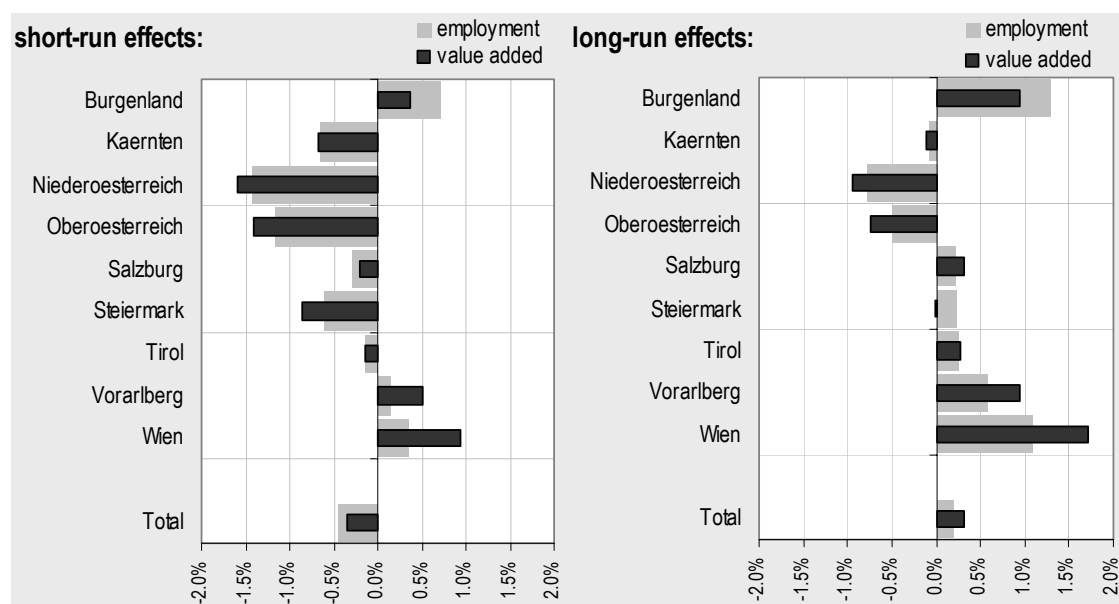
regional specialization: the manufacturing (and agricultural) regions tend to lose out, especially in the short run, whereas more service-oriented regions win (Vienna most prominently so, gaining more than +1.5 percent of GRP in the long run).

Figure 3 shows which sectors contribute most to the total effect: on the one side, there is one big loser, manufacturing (remember, manufacturing exports are forecast to drop by – 2.6 percent in the long run, exacerbated by a +1.6 percent rise in imports), leading to a half percent drop in GDP. However, this is more than compensated by the positive effects, especially in transport and finance/insurance, which gain to the extent of 0.2-0.3 percent of GDP each. The simulated contributions of the other sectors are quite small, though mostly positive; only primary production, processed foods, and other services are reckoned to contract very slightly.

Employment effects show basically the same pattern, although they are more subdued (due to the fact that two of the biggest winners of this policy change, communication, financial services and insurance, have above-average productivity).

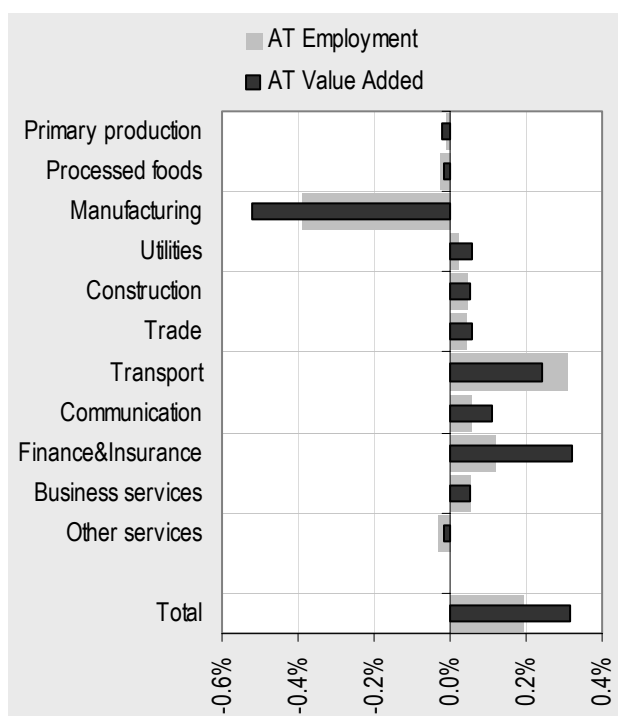
On the regional level (see Figure 4), the contractions in Ober- and Niederoesterreich are mainly driven by manufacturing. The biggest winners, Burgenland and Vienna, owe their favourable position to different sectors: transport in Burgenland, and the "metropolitan" sectors communication and finance/insurance in Vienna.

Figure 2: Effect on regional value added and employment



Source: wiiw, own calculations;

Figure 3: Sectoral contributions to total long-run changes in value added (VA) and employment (ED) for Austria

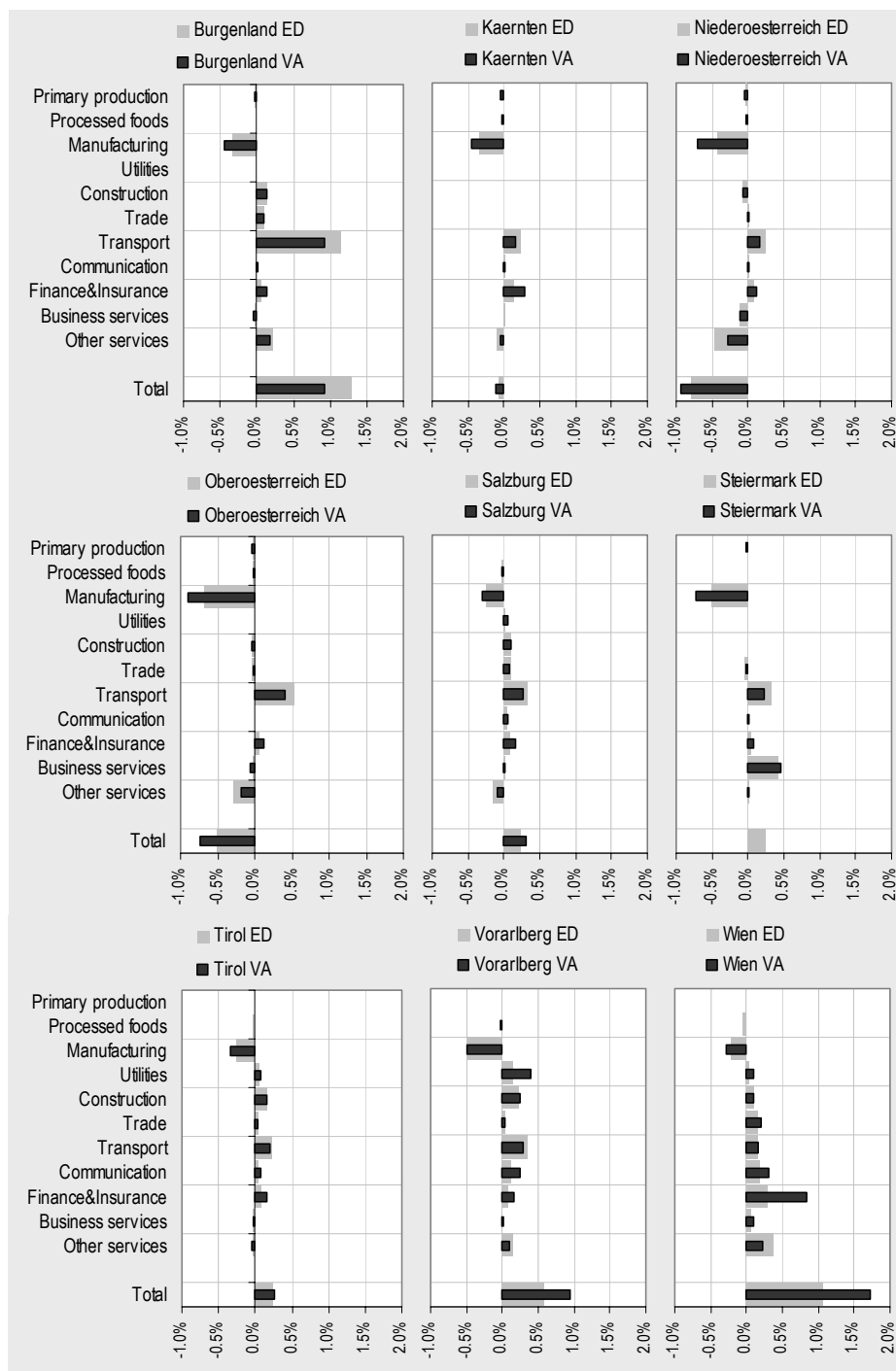


Source: wiiw, own calculations;

The overall positive impacts of a trade liberalization regime seem plausible. The CGE-simulations show that exports of services increase while those for manufacturing decline. Imports, on the other hand, increase for manufacturing as well as for services. Since exports of services are, on average, more value added and employment intensive than exports of manufacturing exports and the increase in service imports is less pronounced than the growth of exports, positive net impacts on GDP and employment are to be expected.



Figure 4: Sectoral contributions to total long-run changes in value added (VA) and employment (ED) at the regional level



Source: wiw, own calculations;

## 4. References

- Almon, C. (1991), The Inforum Approach to Interindustry Modeling, *Economic Systems Research*, 3, pp. 1-7.
- Barker, T., Gardiner, B. Chao-Dong, H., Jennings, N., Schurich, C. (1999), *E3ME Version 2.2, User's Manual*, Cambridge Econometrics.
- Conway, R. S. (1990), The Washington Projection and Simulation Model: A Regional Interindustry Econometric Model, *International Regional Science Review*, 13, pp. 141-165.
- Francois, J., Pindyuk, O., Wörz, J., Trade Effects of Services Trade Liberalization in the EU, *Arbeitspaket im Rahmen des Forschungsschwerpunkts Internationale Wirtschaft (FIW)*, Wien, 2008.
- Fritz, O., Kurzmann, R., Pointner, W., Streicher, G. and Zakarias, G. (2001), Modeling the Regional Economy: A Regional Econometric input-output Approach. In: Neck, R. (ed.), *Modeling and Control of Economic Systems*, Elsevier, Oxford.
- Kratena, K. (1994), MULTIMAC I - das gesamtwirtschaftliche input-output Modell des WIFO, *WIFO Monatsberichte*, 67, Austrian Institute of Economic Research (WIFO), Vienna.
- Kratena, K. and Zakarias, G. (2001), MULTIMAC IV: A disaggregated Econometric Model for the Austrian Economy, Working Paper, 160, Austrian Institute of Economic Research (WIFO), Vienna.
- Rey, S. J., (2000), Integrated regional econometric+input-output modeling: Issues and opportunities, *Regional Science*, 79(3).
- Zakarias, G., Fritz, O., Kurzmann, R. and Streicher, G. (2002), Comparing Regional Structural Change – An Application of Economic input-output Models, *InTeReg Working Paper Series*, 18, Graz-Vienna.



## 5. Appendix

### *Industry classification and concordance with ISIC Rev. 3*

ISIC Rev. 3 code	IO industry	Description
1+2+5	1	Agriculture, hunting, forestry and fishing
10+11+12	2	Mining and quarrying (energy)
13+14	3	Mining and quarrying (non-energy)
15+16	4	Food products, beverages and tobacco
17+18+19	5	Textiles, textile products, leather and footwear
20	6	Wood and products of wood and cork
21+22	7	Pulp, paper, paper products, printing and publishing
23	8	Coke, refined petroleum products and nuclear fuel
24ex2423	9	Chemicals excluding pharmaceuticals
2423	10	Pharmaceuticals
25	11	Rubber and plastics products
26	12	Other non-metallic mineral products
271+2731	13	Iron & steel
272+2732	14	Non-ferrous metals
28	15	Fabricated metal products, except machinery and equipment
29	16	Machinery and equipment, nec
30	17	Office, accounting and computing machinery
31	18	Electrical machinery and apparatus, nec
32	19	Radio, television and communication equipment
33	20	Medical, precision and optical instruments
34	21	Motor vehicles, trailers and semi-trailers
351	22	Building & repairing of ships and boats
353	23	Aircraft and spacecraft
352+359	24	Railroad equipment and transport equipment n.e.c.
36+37	25	Manufacturing nec; recycling (include Furniture)
401	26	Production, collection and distribution of electricity
402	27	Manufacture of gas; distribution of gaseous fuels through mains
403	28	Steam and hot water supply
41	29	Collection, purification and distribution of water
45	30	Construction
50+51+52	31	Wholesale and retail trade; repairs
55	32	Hotels and restaurants
60	33	Land transport; transport via pipelines
61	34	Water transport
62	35	Air transport
63	36	Supporting & auxiliary transport activities; activities of travel agencies
64	37	Post and telecommunications
65+66+67	38	Finance and insurance
70	39	Real estate activities
71	40	Renting of machinery and equipment
72	41	Computer and related activities
73	42	Research and development
74	43	Other Business Activities
75	44	Public administration and defence; compulsory social security
80	45	Education
85	46	Health and social work
90-93	47	Other community, social and personal services
95+99	48	Private households with employed persons & extra-territorial organisations & bodies