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An Evaluation of the EU' Fifth Enlargement With special focus on Bulgaria and Romania

Fritz Breuss

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An Evaluation of the EU's Fifth Enlargement

With special focus on Bulgaria and Romania

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Abstract

The fifth EU enlargement in 2004 and 2007 did not only extend the Single European Market. Since 2009, the euro zone encompasses 16 out of 27 EU member states. Additionally the Schengen area has been expanded to include 25 European countries (22 EU member states). A first evaluation shows that the new member countries have already been able to benefit noticeably from their participation in the single market, despite not yet fully integrated labour markets. However, the international financial crisis also shadows onto the economies of the new member states. After an ex post evaluation the possible future integration effects of EU's 2007 enlargement by Bulgaria and Romania are simulated with a simple macro-economic integration model able to encompass as many of the theoretically predicted integration effects possible. The direct integration effects of Bulgaria and Romania spill-over to EU15, including Austria and the 10 new member states of the 2004 EU enlargement. The pattern of the integration effects is qualitatively similar to those of EU's 2004 enlargement by 10 new member states. Bulgaria and Romania gain much more from EU accession than the incumbents in the proportion of 20:1. In the medium-run up to 2020, Bulgaria and Romania can expect a sizable overall integration gain, amounting to an additional ½ percentage point real GDP growth per annum. Within the incumbent EU member states Austria will gain somewhat more (+0.05%) than the average of EU15 (+0.02%) and the 10 new EU member states (+0.01%), which joined the EU in 2004.

JEL classification: F14; F15; F21; F23; F47

Key words: Economic Integration, EU enlargement; Regionalism; Model simulations

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1. Introduction

EU enlargement is progressing. With the entry of Bulgaria and Romania in 2007 the EU has completed its fifth enlargement which started in 2004 with the accession of ten new members. The EU will enlarge further by absorbing the countries of the Western Balkans (starting with Croatia) and later may be also Turkey will become a member of the EU. EU27 with 492 million inhabitants is the largest regional economic integration area, forming a specific kind of a regional integration agreement (RIA) with maximal economic and institutional integration, ranging from a customs union to the single market and is extending step by step towards an economic and monetary union (EMU) with a single currency – the Euro.

The fifth EU enlargement was dominated by political motives, whereas the preceding enlargements served essentially economic interests to enlarge the single (or internal) market and to create a monetary unification with a single currency. The founding fathers of the European Integration process, however, wanted to create structures to secure sustainable political stability in Europe after the catastrophe of the Second World War. The reason why the fifth EU enlargement was such a grand project was the fact that with it – starting with the breakdown of communism in 1989 – the political separation of Europe was finally ended. Whether this important step of European unification – a step of historic dimension – will pay off finally in economic terms cannot yet be answered definitively. Due to the large gaps in income levels between East and West this integration step will entail economic adjustments. For many entrepreneurs – primarily in the old EU member states – the enlargement of the single market opened up great chances to expand their business. However, the advantages of free movement of capital and hence the great chances for foreign direct investments in the new “emerging markets” are contrasted by the disadvantages of the new member states resulting from the still transitionally closed labour markets for their work force in the majority of the old member states.

Nevertheless a first evaluation of five years of an enlarged EU shows that the expectations of integration effects – primarily in the new member states – have been fulfilled. The economies of nearly all new member states expand faster than before being integrated in the single market of the EU. The participation in EU’s customs union fostered intra-EU trade. The next step is the full participation in EMU with the takeover of the Euro. Four new member states

(Slovenia in 2007, Malta and Cyprus in 2008, Slovakia in 2009) are already member of the Euro area. The enlargement of the Schengen area in December 21, 2007 by nine out of 12 new member states was a further important step of integration. Even Switzerland takes part in the Schengen process as of December 12, 2008. The other new EU member states will follow later: Cyprus in 2009, Bulgaria and Romania in 2011. Schengen and the Euro are two visible and concrete integration steps which can be directly “felt” by the citizens and are positively associated with EU integration. This helps to improve the pro-EU mood of the population, which presently is not so good in many EU member states. The international financial crises which unfolded in earnest mid-year 2008 will lump the industrialized world into recession in 2009/2010. This will also have negative spill-overs to the new EU member states, although their performance is still better than in the old EU member states.

A first empirical evaluation of five years of an enlarged EU is made in the next chapter. In chapter 3 we develop a generalized unified theory which is able to capture most of the theoretical integration effects one expects from enlarging an existing Union. The hitherto and the expected integration effects in the future are then demonstrated in the case of Bulgaria’s and Romania’s EU integration. Chapter 5 presents the results of this integration models for Bulgaria and Romania as well as the spill-overs to Austria, EU15 and the new 10 EU member states (EU10N). Conclusions are drawn in chapter 6.

2. Experiences with EU’s Fifth Enlargement in 2004 and 2007

The fifth EU enlargement in 2004 and 2007 did not only extend the Single European Market. Since 2009, the euro zone encompasses 16 out of 27 EU member states. Additionally the Schengen area has been expanded to include 22 member states. The new member countries have already been able to benefit noticeably from their participation in the Single Market, despite not yet fully integrated labour markets and a still not completed Single Market for Services (see Breuss et al., 2008). The more the EU member states can trade with each other without trade barriers within the Single Market the more they are protected against the perils of globalization (see Breuss, 2008B). Enlarging the Single Market therefore extends also this valuable shield. On the other hand one could argue that the bigger the share of intra-EU trade in total trade due to enlargement (presently, it amounts already to nearly 2/3 of total trade of EU member states) the less interested the EU might be in an early finalization of the Doha Round (see Breuss, 2008A).

With the completion of its fifth enlargement in 2007 the EU increased the number of its members from 25 to 27. However, like in the preceding enlargement steps (1995 and 2004) only small countries entered the EU. In 2004 EU's population increased by 19%, in 2007 by only 6%, GDP (at PPS) increased by 9% and 2% respectively. Intra-EU trade increased by 11% and 1 1/2%, respectively.

Table 1: Macroeconomic Development since EU Enlargement 2004

	GDP, real	GDP p.c. in PPS, in relation to EU 27	HICP	Unem- ployment rate in %	Budget balance in % of GDP	Net exports with EU 27 in % of GDP	Balance of current account in % of GDP
	Ø 2004/2008 compared to Ø 1999/2003	Ø 2004/2008 compared to Ø 1999/2003	Ø 2004/2008 compared to Ø 1999/2003	Ø 2004/2008 compared to Ø 1999/2003	compared to Ø 1999/2003	Ø 2004/2007 compared to Ø 1999/2003	Ø 2004/2008 compared to Ø 1999/2003
	Difference of the average annual change in percentage points			Difference in percentage points			
Czech Rep.	+3.0	+8.4	+0.8	-1.3	+3.0	+7.1	+2.4
Estonia	+0.0	+17.8	+2.2	-4.7	+1.8	-12.3	-6.7
Cyprus	+0.5	+3.3	-0.4	+0.4	+3.3	-4.7	-2.4
Latvia	+1.7	+13.5	+6.6	-4.9	+1.8	-5.7	-9.9
Lithuania	+1.9	+14.3	+4.3	-7.6	+1.3	-5.3	-4.1
Hungary	-1.2	+4.9	-2.1	+1.1	-0.7	-0.9	+0.5
Malta	+0.6	-2.7	-0.1	-0.5	+4.0	+3.2	-3.9
Poland	+2.4	+4.4	-2.2	-4.0	+0.7	+2.1	-0.3
Slovenia	+1.3	+8.6	-3.6	-1.0	+2.1	-4.2	-1.9
Slovakia	+4.7	+11.8	-4.2	-4.4	+4.9	+2.6	-1.3
Bulgaria	+2.1	+7.3	+2.2	-7.9	+2.2	-2.3	-11.6
Romania	+3.7	+10.0	-24.1	-0.3	+1.1	-3.9	-6.9
12 new EU members	+2.1	+7.5	-7.1	-2.3	+1.3	+0.6	-1.7
10 new EU members	+1.9	+6.7	-1.2	-2.7	+1.4	+1.6	-0.6
EU 27	+0.1	+0.0	-0.2	-0.7	-0.4	-0.7	-0.2
Euro area 13	+0.0	-3.0	+0.4	-0.3	+0.0	-0.7	+0.1
Euro area 12	+0.1	-2.6	+0.4	-0.3	+0.1	-0.7	+0.0
EU 15	-0.1	-2.5	+0.5	-0.2	-0.5	-0.8	+0.0

Source: Breuss (2007C), p. 939 and updates with AMECO data (Autumn 2008 Economic Forecast by the European Commission).

A first evaluation leads to the following conclusions (see Breuss, 2007C and Table 1 above):

- The majority of the new member states have grown faster in the period since 2004 than in the previous five years (see Table 1). Slovakia (+4.7%), Romania (+3.7%) and Czech Republic (+3%) as well as Poland (+2.4%) exhibited a higher average annual growth rate of real GDP than those of the 12 new member states (+2.1%). Bulgaria performed like the average. The others performed below the average of the 12 new member states. Hungary (-1.2%) was the only country with declining average growth rates and hence was the only loser of enlargement so far.

The economy of EU 27 on average grew faster by 0.1 percentage point than before 2004, whereas EU 15's GDP contracted slightly by 0.1%. This growth bonus of 0.2 percentage points matches with the expectations in previous studies on the integration effects of the fifth EU enlargement (e.g. see Breuss, 2002).

The international financial crisis leads also to a diminished growth performance in the new EU member states. The IMF, the OECD as well as the European Commission revised downward their economic forecasts at the end of 2008. The Vienna Institute for International Economic Studies (see wiiw, 2008) sees three of the new EU member states sliding into recession: Hungary in 2009 (real GDP -1%), Estonia already in 2008 (-2%), but also in 2009 (-2%) and 2010 (-1%). On average, however, GDP growth is still higher in the 10 new EU member states in Eastern Europe (2008 +5%, 2009 +2.7%, 2010 +3.5%) than in EU-15 (+1.1%, -0.1%, +0.8%) and, hence in EU-27 (+1.4%, +0.2%, +1.1%).

- The last EU enlargement, however, also contributed to a statistically „impoverishment“ of the enlarged EU. As a consequence the average GDP per capita was reduced by nearly 11 percentage points. Insofar, the completion of one of the Lisbon targets – the closing of the income gap vis à vis the USA - is getting more difficult than before. After EU enlargement, the income gap vis à vis the USA has increased to 51 percentage points from 35 percentage points between USA and EU 15. We need a long period of catching-up in the new member states with permanently high growth rates in order to correct this deficiency.
- The other macro variables exhibited a mixed picture. The situation of the labour market has improved in most new member states, their unemployment rates decreased. Inflation could be largely subdued. With the exception of Hungary, the budgetary consolidation process succeeded in all new member states.
- The new EU member states expanded their trade with the old EU member states. More so trade was created between themselves. Also the old EU member states redirected their trade flows towards the new member states (intra EU trade creation), a process at the expense of intra-EU-15 trade (intra-EU trade diversion; see Table 2).

Table 2: Shifts of Trade since Opening-up of Eastern Europe and since EU Enlargement

Reporter	EU 27			EU 15			12 new EU member states		
	Export shares		Trade balance	Export shares		Trade balance	Export shares		Trade balance
	2007 In %	1993/2007 Change in percentage points	2007 Bn. \$	2007 In %	1993/2007 Change in percentage points	2007 Bn. \$	2007 In %	1993/2007 Change in percentage points	2007 Bn. \$
Belgium	76.9	-1.6	35.51	72.9	-4.4	30.11	4.0	+ 2.8	5.41
Denmark	70.0	+2.5	-0.77	63.9	-1.0	-0.92	6.2	+ 3.5	0.15
Germany	64.7	+2.6	166.61	53.5	-3.4	140.62	11.2	+ 6.0	25.99
Greece	64.6	-7.3	-28.77	42.9	-19.1	-29.37	21.7	+ 11.8	0.60
Spain	69.6	-2.2	-61.74	65.2	-5.3	-60.26	4.4	+ 3.1	-1.48
France	64.6	+3.3	-67.71	59.5	-0.3	-69.73	5.1	+ 3.6	2.02
Ireland	63.7	-7.9	21.24	62.0	-9.2	20.33	1.9	+ 1.3	0.90
Italy	60.0	-1.0	7.61	61.9	-5.8	-1.72	8.8	+ 4.8	9.33
Luxembourg	87.6	+2.4	-0.49	81.7	-2.8	-1.43	5.8	+ 5.2	0.94
Netherlands	77.9	+0.3	183.23	72.4	-3.3	167.87	5.5	+ 3.6	15.36
Austria	72.5	-4.2	-10.66	55.7	-10.5	-20.42	16.8	+ 6.3	9.76
Portugal	74.4	-6.1	-18.61	72.1	-8.1	-18.51	2.3	+ 2.0	-0.11
Finland	56.7	-7.4	-1.91	48.5	-10.9	-4.49	8.3	+ 3.4	2.58
Sweden	60.5	+1.8	-4.86	54.2	-2.2	-4.79	6.3	+ 4.0	-0.07
United Kingdom	55.4	+1.7	-91.44	52.1	+0.0	-80.68	3.4	+ 1.7	-10.77
Czech Rep.	85.2	+3.1	9.67	64.2	+10.2	3.92	21.0	- 7.1	5.75
Estonia	69.9	+6.9	-4.50	50.0	+1.8	-3.35	19.9	+ 5.1	-1.14
Cyprus	59.3	+13.3	-5.12	52.9	+13.1	-4.93	6.3	+ 0.3	-0.19
Latvia	72.7	+30.7	-5.80	38.5	+6.4	-3.50	34.2	+ 24.3	-2.30
Lithuania	64.7	-20.3	-5.39	37.7	-29.2	-4.39	27.0	+ 8.9	-1.00
Hungary	78.7	+16.3	8.62	58.9	+0.9	3.10	19.8	+ 15.4	5.52
Malta	48.7	-23.7	-1.78	46.4	-25.6	-1.77	2.3	+ 1.9	-0.01
Poland	78.6	+4.5	-9.27	62.9	-6.3	-14.98	15.7	+ 10.8	5.70
Slovenia	69.5	+2.4	-2.44	54.0	-7.6	-3.99	15.5	+ 10.0	1.55
Slovakia	86.7	+5.6	5.75	58.2	+28.6	7.53	28.4	- 23.0	-1.77
Bulgaria	60.7	+7.7	-6.40	49.0	+2.0	-4.41	11.6	+ 5.7	-1.99
Romania	72.0	+24.6	-20.81	57.7	+16.3	-15.00	14.3	+ 8.2	-5.81
EU 15	66.5	+1.8	24.40	59.1	-2.5	-8.61	7.4	+ 4.3	33.02
EU 27	67.7	+2.8	-13.06	59.1	-2.3	-50.39	8.7	+ 5.1	37.33

Source: Breuss (2007C), p. 942 and updates with IMF, Direction of Trade statistics.

- In spite of the brisk trade activities since 2004 it seems as if the old EU member states could exploit their comparative advantages much better than the new member states. This is reflected in the improvement of the trade and current account balances in trade with the new member states. Many new member states, however, in trade with the old member states generated high deficits in both balances, respectively. Relatively better performed only the more advanced five CEEC countries, primarily neighbours of Austria.

Table 3: Foreign Direct Investment since Opening-up of Eastern Europe and since EU Enlargement

	FDI flows ¹⁾				FDI inflows		FDI stock ³⁾	
	Outflow abroad		Inflow from abroad		p.c. ²⁾	p.c. ²⁾	p.c	In the new EU members ⁴⁾
	Ø 2004/2006	Ø 2004/2006 compared to Ø 1993/1995	Ø 2004/2006	Ø 2004/2006 compared to Ø 1993/1995	Ø 1989/2007	2007	2007	In the new EU members ⁴⁾ December 2006
		In % of GDP Change in percentage points		Change in percentage points	In \$	In €	In €	Shares of total FDI in %
Belgium	11.3	.	13.1	.	.	.	1.6	
Denmark	1.7	-0.08	1.2	-1.04	.	.	1.7	
Germany	1.8	+0.65	0.8	+0.53	.	.	17.1	
Greece	0.9	.	1.1	+0.05	.	.	1.4	
Spain	5.6	+4.93	2.1	+0.50	.	.	2.2	
France	4.5	+3.10	3.0	+1.69	.	.	7.0	
Ireland	8.8	+7.97	-4.8	-6.69	.	.	.	
Italy	1.9	+1.36	1.0	+0.66	.	.	3.6	
Netherlands	10.0	+5.62	2.5	+0.13	.	.	17.8	
Austria	2.5	+2.09	1.4	+0.62	.	.	11.0	
Portugal	2.4	+1.88	2.4	+1.30	.	.	.	
Finland	0.6	-1.69	1.9	+0.79	.	.	2.0	
Sweden	6.4	+3.54	1.24	+0.79	.	.	5.0	
United Kingdom	3.7	+0.51	4.5	+4.32	.	.	3.9	
Czech Rep.	0.6	+0.44	6.0	+3.00	6.337	764	6.612	
Estonia	.	.	.	.	5.960	831	8.416
Latvia	.	.	.	.	3.347	838	3.183
Lithuania	.	.	.	.	2.322	417	2.977
Hungary	2.0	+1.89	5.6	-1.18	4.829	219	6.600	
Poland	0.9	+0.86	4.0	+1.87	2.621	472	2.900	
Slovenia	.	.	.	.	1.241	-176	4.000
Slovakia	0.5	+0.31	5.0	+3.60	4.366	534	5.900	
Bulgaria	.	.	.	.	3.854	1067	3.252
Romania	.	.	.	.	2.069	452	1.914
EU 15	3.81	+3.08	3.4	+2.45	.	.	78.9	

¹⁾ OECD Factbook 2008 (Source OECD online). - ²⁾ EBRD. Transition Report 2008: Growth in Transition, p. 17. - ³⁾ Hunya (2008), WIIW Database on Foreign Direct Investment 2008 in Central, East and Southeast Europe, p. 8 and 49. - ⁴⁾ Without Malta and Zypern; Hunya (2008), p. 49..

Source: Breuss (2007C), p. 943 and updates.

Table 4: Maastricht Convergence Criteria – Present status and future changes

	Access to EMU	Inflation rate		Budget balance general government		Gross debt general government		Long-term interest rate 2008 In %	Degree of integration in EMU
		2007 In %	2008	2007 In % of GDP	2008	2007 In % of GDP	2008		
Reference values		2.8	4.3	-3.0	-3.0	60.0	60.0	6.3	
Belgium	1999	1.8	4.7	-0.3	-0.5	83.9	86.5	4.5	€
Bulgaria		7.6	12.4	0.1	3.3	18.2	13.8	5.3	CB
Czech Rep.		3.0	6.6	-1.0	-1.2	28.9	26.6	4.6	
Denmark		1.7	3.8	4.5	3.1	26.2	21.1	4.4	ERM II.
Germany	1999	2.3	3.0	-0.2	0.0	65.1	64.3	4.1	Opt-out
Estonia		6.7	10.6	2.7	-1.4	3.5	4.2	7.9	€
Ireland	1999	2.9	3.3	0.2	-5.5	24.8	31.6	4.5	ERM II.
Greece	2001	3.0	4.4	-3.5	-2.5	98.4	93.4	4.8	CB
Spain	1999	2.8	4.2	2.2	-1.6	36.2	37.5	4.5	€
France	1999	1.6	3.3	-2.7	-3.0	63.9	65.4	4.3	€
Italy	1999	2.0	3.6	-1.6	-2.5	104.1	104.1	4.7	€
Cyprus	2008	2.2	4.5	3.5	1.0	59.5	48.2	4.5	ERM II.
Latvia		10.1	15.7	0.1	-2.3	9.5	12.3	6.1	€
Lithuania		5.8	11.9	-1.2	-2.7	17.0	17.5	5.1	ERM II.
Luxembourg	1999	2.7	4.4	3.2	2.7	7.0	14.1	4.7	ERM II.
Hungary		7.9	6.3	-5.0	-3.4	65.8	65.4	8.4	€
Malta	2008	0.7	4.4	-1.8	-3.8	62.2	63.1	4.9	ERM II.
Netherlands	1999	1.6	2.5	0.3	1.2	45.7	48.2	4.3	€
Austria	1999	2.2	3.4	-0.4	-0.6	59.5	57.4	4.4	€
Poland		2.6	4.3	-2.0	-2.3	44.9	43.9	6.1	
Portugal	1999	2.4	2.9	-2.6	-2.2	63.6	64.3	4.6	€
Romania		4.9	7.8	-2.6	-3.4	12.9	13.4	7.7	
Slovenia	2007	3.8	6.2	0.6	-0.2	23.4	21.8	4.6	€
Slovakia	2009	1.9	4.0	-1.9	-2.3	29.4	28.8	4.8	ERM II/€.
Finland	1999	1.6	4.2	5.3	5.1	35.1	31.6	4.3	€
Sweden		1.7	3.0	3.6	2.6	40.4	34.7	4.0	
United Kingdom		2.3	3.7	-2.8	-4.2	44.2	50.1	4.6	Opt-out
EU 27		2.4	3.9	-0.9	-1.6	58.7	59.8	4.5	
Euro area 16		2.1	3.5	-0.6	-1.3	66.1	66.6	4.1	

CB . . . Currency Board. ERM II . . . participation in the Exchange rate mechanism II (national exchange rate can fluctuate vis à vis the Euro within a band of $\pm 15\%$). € . . . participation in the Economic and Monetary Union (EMU). Opt-out . . . "Opting-out" clause according to the Maastricht Treaty.

Source: Breuss (2007C), p. 946 and updates with AMECO data (Autumn 2008 Economic Forecast by the European Commission).

- Since the opening-up of Eastern Europe in 1989 and more so after the EU enlargement in 2004 and 2007, the new market economies in Eastern Europe, the formerly Central and Eastern European countries (CEECs) developed to an important emerging market for companies in Western European countries. In particularly countries like Austria, but also Germany with long-lasting traditional relations with the CEES took advantage from this

new situation. The Netherlands, Austria and Germany are the most prominent foreign direct investors in the CEEC (see Table 3). Those new member states which during its transitional period privatized early and to a high degree also attracted the biggest share of FDI inflows.

- With the exception of Slovenia (since 2007), Malta and Cyprus since 2008 and Slovakia in 2009, the new member states are not yet ready to become full members of the EMU. They have to wait and try to comply with the Maastricht convergence criteria. In most of the new member states, partly their inflation rate (and/or the long-term interest rate) is too high, partly the budget deficit is not in conformity with the criteria. The latter is particularly true for Hungary (see Table 4).

3. A stylized generalized unified theory of EU enlargement

The theory of regional economic integration has to deal with geographically discriminatory trade policy issues and is regulated in different types of regional integration agreements (RIAs)¹, ranging from free trade agreements (FTAs) to custom unions (CUs) and in the case

¹ RIAs which are also called regional trade agreements (RTAs) or free trade areas (FTAs) are preferential agreements and in principle inconsistent with the GATT's most favored nations (MFN) principle. However, GATT Article XXIV specifically allows RIAs unless they violate certain conditions. Free trade areas (FTAs) – like the EFTA or NAFTA – or customs unions (CUs) – like the EU – are allowed under the GATT unless they fail to eliminate barriers on “substantially all the trade” among members and, additionally, that external tariffs “shall not on the whole be higher or more restrictive” than prior to the formation of the FTA. Sluggish or no progress in the Doha Development Round has accelerated further the rush to forge RTAs. The total number of (at the WTO) notified preferential agreements in force is currently 170, while a further considerable number is under negotiations/proposal stage (see Crawford and Fiorentino, 2005, p. 1).

Pascal Lamy (see: http://www.wto.org/english/news_e/sppl_e/sppl53_e.htm), Director-General of the WTO forecasted recently that by 2010 around 400 of such agreements could be active, increasing the complicated web of incoherent rules, coined by Professor Bhagwati (1995) a “spaghetti bowl” of twisted rules of origin. Whereas the trade purists condemn bilateral “spaghetti bowls” as second or third best welfare solutions to liberalizing world trade, Baldwin (2006B) takes them as political facts and as “building blocs on the path to global free trade”. Accordingly, moving to global free trade requires the political will of WTO member states to multilateralisation of regionalism. By 2010, Baldwin sees the world as three more or less perfectly formed trade blocs – one in Europe, one in North America and one in East Asia. However, the blocs might be fuzzy since the proliferation of FTAs makes it impossible to draw sharp lines around the big-3 trade blocks, and leaky since some FTAs create free trade “canals” linking the big 3 blocs.

The EU can be taken as a good example how to tame the “spaghetti bowl syndrome”. Firstly, by its continuing enlargements from originally six to 27 members it integrated most of the EFTA countries. Secondly, by pushing through the Pan-European Cumulation System (PECS) in 1997 (on the basis of the European Economic Area – EEA – agreement of 1994) it simplified the spaghetti muddle in Europe. With this the EU15, the EFTA4 (Iceland, Liechtenstein, Norway and Switzerland), and ten of the then applicant nations in Central Europe decided to amend their various FTAs by substituting a common set of rules of origin for those they originally contained. Value could thus be cumulated between different European countries without prejudicing the duty-free status of end products. PECS was extended to Turkey (with which the EU forms a CU since 1996) in 1999. In 2005 the system has been enlarged to the Faroe Islands and the Mediterranean countries, and hence is commonly referred to as the Pan-Euro-Mediterranean cumulation system (PEMCS; for more details (general overview, legal framework, specific provisions) on the Pan-Euro-Mediterranean cumulation system, refer to the

of the EU it is a Single Market (SM) and partly also an Economic and Monetary Unions (EMU). Starting with the seminal work on CUs by Viner (1950) the theory of RIAs evolved along the lines of the new trade theory and was sometimes ahead of the political reality of RIAs, sometimes behind them. In the meantime the economic (and institutional) integration of the EU has come to its maximum possible level of an EMU with a single currency. Whereas most of the world-wide existing RTAs can be analyzed with Viner's theory of CUs or maybe with the theoretical extensions and generalizations of his followers (e.g. Cordon, 1972; Lloyd, 1982; Kennan and Riezman, 1990) the evaluation of EU's economic integration effects requires much more ingredients of modern trade theory. This is even more the case if one wants to analyze EU's enlargement which – as a special case – is the integration of two kinds of economies, a bloc with rich countries (the old EU15) with a bloc of poor (mostly transitional) economies like the 10 new member states which acceded the EU in 2004 and Bulgaria and Romania who became EU members in 2007. In this case of integration of unevenly high developed countries factors movements might dominate the trade effects.

Due to the complexity of EU's integration (enlargement in particular) one dreams of finding a "Grand Unified Theory" (GUT) like in theoretical physics.² In the case of regional economic integration, Baldwin and Venables (1995) recommended such a GUT for the case of a (fictitious) country entering a RIA and by Kohler (2004) for the case of an incumbent country (Germany) if the EU is enlarging. In chapter 2 we present a stylized GUT of EU's enlargement. Based on this insights we build a simple model of EU's fifth enlargement encompassing as many of the integration effects predicted by the GUT as possible.

In the following we study the welfare change in an open economy – in our case for a small country – joining the EU.

Following Baldwin and Venables (1995, p. 1691) suppose that the welfare of a representative consumer in the new EU member state at the time of acceding the EU can be represented by

homepage of the European Commission:

http://ec.europa.eu/taxation_customs/customs/customs_duties/rules_origin/preferential/article_783_en.htm).

The PEMCS comprises 42 countries and is applicable between the EC and Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Syria, Tunisia, West Bank and Gaza Strip, the EEA/EFTA countries (Iceland, Norway and Switzerland, including Liechtenstein), the Faroe Islands and Turkey. PEMCS members account for about 40% of world trade. For a description of EU's spaghetti bowl, see Breuss, 2007B, p. 649.

² Theoretical physicists are searching for a unified theory that unifies three "fundamental" gauge symmetries: hypercharge, the weak force, and quantum chromo dynamics. So far, physicists have been able to merge electromagnetism and the weak nuclear force into the electroweak force, and work is being done to merge electroweak and quantum chromo dynamics into a QCD-electroweak interaction. Beyond grand unification, there is also speculation that it may be possible to merge gravity with the other three gauge symmetries into a "Theory of Everything" (THE); see: http://en.wikipedia.org/wiki/Grand_unification_theory)

an indirect utility function $V(p+t, n, E)$, where p is the vector of border prices, t is a vector of trade costs including the tariff equivalent of import barriers (NTBs like border controls), n is a vector of the number of product varieties available in each industry, and the scalar E is total spending on consumption. Expenditure of a new EU member state is equal to the sum of factor income, profits, and rent from trade barriers that accrues to domestic agents (including the government), minus investment and income out of the EU budget under the title of structural funds transfers: $E = wL + rK + X[(p+t) - a(w, r, x)] + \alpha t m - I + SF$. Total factor income is $wL + rK$, where L and K are the country's supply of labour and capital and w and r are factor prices. The third term on the right hand side is total profit. It is the inner product of the economy's production vector X and the gap between domestic prices and average costs, $a(w, r, x)$, where average cost in each sector depends on factor prices and production per firm in that sector, x . Domestically accruing trade rents amount to $\alpha t m$, where m is the net import vector (positive elements indicate imports) and α is a diagonal matrix that measures the proportion of the wedge t that creates income for domestic agents; $\alpha = 1$ for a tariff or other barrier with domestically captured rent (DCR) and $\alpha = 0$ for a barrier where no trade rent is captured domestically (nonCDR). For example, t may represent real trade costs or a quota or voluntary export restraints (VER) under which foreigners capture the quota rents or in the case of integrating into the single market the trade costs of border control. Finally, I denotes investment and SF net income from structural funds transfers out of the EU budget.

By totally differentiating $V(p+t, n, E)$ and dividing through by the marginal utility of expenditure V_E Baldwin and Venables (1995, p. 1601 and Appendix A) derive an equation (here slightly extended) of welfare change which can be interpreted as a stylized GUT for a new EU member state in the process of EU enlargement³:

$$\begin{aligned}
 dV/V_E = & \alpha dm - md[t - \alpha] - m dp \\
 & + [p + t - a]dX - xa_x dx + (V_n/V_E)dn \\
 & + (\tilde{r}/\rho - 1)dI \\
 & + dSF
 \end{aligned} \tag{1}$$

A GUT of enlargement should be able to explain at least three major effects of regional integration: *allocation of resources* (static “trade effects”, “scale effects”), *accumulation or*

³ Kohler (2004) derives a similar welfare equation for a single incumbent EU country, in particular for Germany.

growth effects and *location effects*⁴ inclusive *factor movements*. Equation (1) involves the following integration effects:

i) “*Trade effects*”: The first row includes static welfare effects of models with *perfect competition*. The first term is the “trade volume” effect. The trade volume changes subject to the wedge created by DCR trade barriers, α . The second term is the “trade cost” effect, measuring the change in costs generated by changes in the nonDCR elements of trade barriers. The third is the “terms of trade” effect. The last effect occurs only if the acceding country is a large country having the possibility to influence world trade prices. In the case of EU’s enlargement 2007 (as in those of 2004) only small countries joined the EU, which means that the third term is zero⁵. Prior to EU accession, candidate countries of the 2004 and 2007 enlargement already abolished tariffs in trade with the old EU member states in the context of the asymmetric liberalization process of the Europe Agreements (EAs). After EU accession the new member states entered the CU of the EU and now participate in EU’s single market program. That meant, on the one hand, adjustments of the national external tariff to EU’s CET and the abolishment of border controls. Hence, the remaining trade costs were eliminated. Interpreted with equation (1), in the pre-accession period (with $\alpha=1$) the reduction of tariffs (t) contributed negatively to welfare (first term), whereas after accession (with $\alpha=0$) the elimination of border controls and hence reduction of trade costs (t) contributed positively to welfare (second term).

Euro’s pro-trade effect: The experience with the existing Euro area so far shows that the introduction of the Euro additionally reduces transaction costs and hence stimulates intra-euro-area trade in the range between 5% and 15% (with 9% the best estimate), depending on

⁴ Location effects are discussed by Baldwin and Venables (1995, pp. 1616 ff.) in the context of the insights of models of “economic geography”, pioneered by Krugman (1991). This model category also considers factor movements from one location to the other, from the “periphery” to the “centre” or vice versa.

⁵ Baldwin and Venables (1995, pp 1604-1605) discuss in the context of an RIA with “large” countries the case of three countries, in which countries 1 and 2 form the RIA and country 3 remains outside. The members of the RIA can influence the terms of trade, and hence, the third term of equation (1) becomes relevant. The theoretical analysis of three-country problems (with three goods) becomes easily intractable or delivers ambiguous results (see Lloyd, 1982). The Kemp-Wan theorem (Kemp and Wan, 1976) gives a powerful and beautiful answer to the question what configuration of trade policy (towards non-members) would result in a necessarily welfare improving CU. Collect any subset of countries in a trading world. Hold their net trade vector with the rest of the world fixed (at the pre-CU level) and treat it as an endowment. Maintaining standard assumptions, direct application of the first welfare theorem suggests that the union’s welfare is improved when all internal barriers to trade are eliminated. The difference between external prices and prices within the CU (common to all CU countries) determined the common external tariff of the CU. Each country within the union could be made better off than before using a suitable scheme of lump-sum redistributions while the rest of the world is left no worse off. The beauty of the Kemp-Wan solution lies in its ability to provide this ambiguous welfare result sidestepping the problem of second-best intrinsic to the analysis of PTAs. The Kemp-Wan theorem gained further attraction in alternative interpretations (see Richardson, 1995) and extensions of free trade areas (see Ohyama, 2004; Bond et al., 2004).

the method of gravity model estimates (for a critical survey, see Baldwin, 2006A). New research suggests, however, that reduced transaction costs were not primarily responsible for the pro-trade effect of the introduction of the Euro, arguing instead that it was caused by the export of new goods to Euro zone economies. The mechanism driving this is seen in a reduction in the fixed cost of introducing new goods into Euro zone markets (for such arguments, see Baldwin, 2006A, p. 87). Applying the “Casella effect” (see footnote 6) to the introduction of the Euro one finds a small country bonus: on average the Euro has led to improvement of small Euro area countries relative export performance by 3 to 9 percent (see Badinger and Breuss, 2008B). One can expect that the same mechanism will play a role when the new member states of EU’s 2004 and 2007 enlargement will join the Euro zone (first estimates forecast an increase of 5% intra-euro-area trade in the new EU member states; see Belke and Spies, 2007).

ii) “*Scale effects*”: The three terms in the second row capture theoretical predictions of models with increasing returns to scale and *imperfect competition*. The first term is the “output” effect, arising if there is a change in output in industries where price differs from average cost. The second term is the “scale” effect, which gives the value of changes in average costs induced by changes in firm scale⁶. The third term gives “variety” effects which may arise when the number of differentiated consumer products changes, like in trade models with Dixit-Stiglitz type utility functions and ingredients of the theory of monopolistic competition (see Grossman and Helpman, 1991).

iii) “*Accumulation effects*”: The term in the third row captures what is also called the “growth” effect of regional integration. It implies that a change in investment is instantaneously costly, but it also augments the capital stock with a social rate of return \tilde{r} . Discounting this at a social discount rate ρ gives the present value \tilde{r}/ρ , and a change in investment has a first-order welfare effect if this ratio differs from one.

iv) “*Net EU budget receiver effects*”: The term of the fourth row indicates the welfare improvement of being a net receivers vis à vis the EU budget. All countries of the fifth EU enlargement were poor countries and therefore eligible for high structural funds transfers out of the EU budget.

⁶ A special case is the „Casella effect“. It implies that in case of trade bloc enlargement the gains from enlarging the bloc fall disproportionately on small countries, because – if economies of scale imply that firms located in large countries enjoy lower costs - the entrance of new members diminishes the importance of the domestic market and improves the small countries’ relative competitiveness (see Casella, 1996). Empirically, the “Casella effect” cannot be generally verified (see Badinger and Breuss, 2006).

v) *“Location or globalisation effects”*: A stylized GUT of a country joining the EU should also capture effects of “globalisation” or factor movements. Integration of rich and poor countries under the conditions of the rules of the single market (free movement of capital and labour, besides free movement of goods and services) induces huge factor flows: FDI from the old to the new EU member states because of expected higher rents in the “emerging markets” of Eastern Europe and labour from the new to the old member states because of the huge wage differential in the order of up to 1:10. Such factor movement and its welfare implications are only indirectly captured in equation (1). FDI inflows in the acceding country may renew the capital stock and hence increase investment (third row). Labour emigration leads to a welfare loss (“migration loss”) in the sender country and to a welfare gain (“immigration surplus”) in the recipient country (the old EU member states). In the context of equation (1) labour migration could be only interpreted if one assumes wage differentials in the expenditure equation E , which would induce migration. In the special case of EU enlargement it might well be that the effects of factor movements dominate the trade effects.

4. A model-based evaluation of Bulgaria’s and Romania’s accession to the EU

In the following we assume that the whole bunch of integration effects of the 2007 EU enlargement – i.e. the participation in the single market - is only occurring in the acceding countries Bulgaria (BG) and Romania (RO). The old EU (EU15), the bloc of new member states of the 2004 EU enlargement (EU10N⁷) and Austria (AT) are affected only indirectly via spill-overs from BG and RO. Hence, we work with a prototype model approach for the case of 3 countries and two trade blocs. We model the integration effects explicitly for BG and RO, using a simple macro-model approach with no sectoral break-down like in computable general equilibrium (CGE) models. Most of the econometrically estimated equations are reduced form equations, capturing the essential linkages of integration channels (see Appendix A).

4.1 Implementing the theoretical integration effects

On the basis of the stylized GUT of equation (1) we explain the integration effects considered in our simple model and the channels of interactions. However, contrary to the theoretical ambitions laid down in equation (1) which explain changes in welfare due to regional

⁷ EU10N = Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia. The integration effects of EU’s 2004 enlargement for the old and new member states were estimated with model simulations in Breuss (2002).

integration for a new member of a RIA we aim at explaining the changes in real GDP as the final “welfare” measure due to the EU accession of BG and RO. Most of the integration effects modelled target directly the accumulation or growth effects of enlargement and do not consider static trade effects and its implications of trade creation and trade diversion.

Ad i) “Trade effects

(1) Static welfare effects: A separate CGE analysis of the enlargement of EU’s customs union (CU) in 2004 and 2007 is executed by applying the GTAP 6 model (see Dimaranan, 2006) with 12 countries/regions, 3 sectors and 5 factors of productions using the data base 2001 (see Table 5). The EU27 CU was simulated by eliminating all remaining tariff barriers between the member states and considering the adjustment of national external tariffs to the Common External Tariff (CET) of the EU. Prior to 2004 and 2007 the EU15 CU already existed. Therefore only tariffs on trade between the countries of the EU10N, Bulgaria and Romania on the one hand and those for trade between EU10N, Bulgaria and Romania with EU15 (incl. the customs union with Turkey) on the other hand had to be eliminated; in addition EU’s CET had to be adopted by the newcomers. The calculated trade, welfare and GDP effects are to be interpreted as long-run deviations from the base line, which is the CU of EU15 (inclusive Turkey).

The main winners of the EU27 CU are the new 10 member states (EU10N) of EU’s 2004 enlargement, Bulgaria and Romania of EU’s 2007 enlargement and partly also Turkey. Trade creation in intra-trade between the EU10N states increased by 10.8%, welfare and real GDP increased by 0.2%. Even bigger welfare and GDP effects resulted for Bulgaria and Romania which could stimulated their trade with EU10N considerably. Austria also profited from additional trade creation with the new member states and a slight welfare gain of 0.06% of GDP. The remaining member states of EU15 increased its trade with the group of EU10N by 4 ¼% and even more with Bulgaria and Romania. However, welfare and GDP did not change. EU’s 2004 enlargement led to a considerable trade diversion from the old EU member states to the new ones. Austria’s trade with EU14 declined to the same amount as the intra-EU14 trade. If one extends this exercise and considers the trade cost reduction by eliminating border controls (single market entry effect) – assuming bilateral reduction of trade costs equivalent to a 2.5 percent tariff reduction – augments the results of the CU exercise slightly, but does not change the qualitative results of changes in the pattern of regional trade flows.

Table 5: Trade Effects of EU's enlarged Customs Union (incl. Turkey) as of 2004 and 2007

<i>Trade with</i>	Austria	EU14	EU10N	BG	RO	TK	CA	WF	GDP
	Bilateral trade (%-change compared to baseline = EU15 CU)						in % of GDP, change	in % of GDP, change	%- change
Austria	-	-0.63	7.26	28.02	15.56	-0.87	-0.02	0.06	0.01
EU14	-0.25	-0.26	4.26	38.21	14.43	-0.49	0.01	0.01	0.00
EU10N	4.97	4.60	10.78	0.66	-0.46	20.84	-0.70	0.22	0.24
Bulgaria	4.66	13.06	37.58	-	-7.26	8.95	-2.82	1.10	1.19
Romania	3.53	4.37	39.12	-17.67	-	0.22	-3.02	0.65	0.65
Croatia	-1.88	-1.77	30.48	-4.29	30.97	19.24	-0.10	0.22	0.04
Albania	0.08	-0.03	-0.38	-17.50	24.06	8.50	0.03	-0.02	-0.01
Turkey	1.93	2.67	30.15	-17.50	43.81	-	-0.17	0.19	0.08
EFTA	-0.06	-0.12	1.72	17.91	13.72	-2.77	0.02	-0.01	0.00
Rest Europe	-1.45	-1.28	15.42	-7.37	19.60	17.49	-0.11	0.10	0.01
NAFTA	0.20	0.01	4.84	-5.78	12.93	1.03	0.01	0.00	0.00
ROW	0.06	-0.08	1.07	-15.66	-1.41	6.21	0.02	0.00	0.00
Total	0.26	0.06	4.90	12.43	10.16	2.39	0.00	0.00	-

EU10N = Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia; BG = Bulgaria, RO = Romania; TK = Turkey, EFTA = Switzerland and Rest-EFTA; Rest Europe = Russia and Rest Eastern Europe; ROW = Rest of the World; CA = current account; WF = Welfare; GDP = real GDP.

Source: Own simulations with the GTAP 6 model with 12 countries/regions, 3 sectors (food, manufacturing and services) and 5 factors of production (land, unskilled labour, skilled labour, capital and natural resources); data base 2001.

Is then the progressing EU enlargement consistent with the Kemp-Wan theorem? This would imply that trade with non EU CU countries remained unchanged and would not hamper third country's welfare. Although our analysis is not directly suitable to evaluate the Kemp-Wan theorem, one conclusion can be drawn from the fifth EU enlargement: EU14's trade with the rest of the world (ROW) declined slightly whereas those of Austria's and EU10N's trade with the ROW increased. As the decline of EU14's trade is nearly zero implying no welfare changes in ROW, but welfare increases in the enlarged EU's CU one could conclude that this approximately satisfies the Kemp-Wan propositions.

(2) *Dynamic or growth effects of trade ("trade and productivity" links)*: In our simple enlargement model for BG and RO we consider the growth-enhancing effect of the opening up of both countries. The explicitly estimated equations can be found in Appendix A. In line with the insights of Frankel and Romer (1999) on the links between trade and productivity (for an industry perspective, see Badinger and Breuss, 2008A), surveyed by Lewer and Van den Berg (2003)⁸ we model directly the link between the change of openness (measured by export (X) plus import (M) shares of GDP) and productivity growth in the productivity equation (PR). Via implementing PR as a proxy for total factor productivity in our GDP equation (Y) we are able to capture the trade effect on growth for BG and RO. The shares of

⁸ Lewer and Van den Berg (2003), surveying the literature on the growth effects of trade found an astonishing regularity: "Every 1 percentage point increase in the growth of trade (exports) leads to a 0.22 percentage point increase in economic growth".

exports are explained by the usual income (weighted GDP growth of the partner countries in EU15, AT and EU10N) and relative price (real exchange rate) effects plus an EU enlargement or scale effect in the export equation. The EU enlargement effect is captured by a dummy for the increasing size of the EU from 6 over 9 to 10, 15, 25 and 27 (ENLCTR). In this way we can also capture the opening-up of the EU in its trade with the CEECs via the Europe Agreements (EAs) since 2000, already prior to EU accession in 2007. The import share equation (M) explains imports with the usual income (instead of its own GDP growth, the export share variable X is used) and relative price (real exchange rate- REER) effects. Additionally, a dummy (INT) captures the effects of the opening-up of trade with the EU via the asymmetric trade liberalization of the EAs prior to EU accession in 2007.

Ad ii) "Scale and imperfect competition effects": As we deal only with a simple aggregate or macro model for BG and RO we capture only one effect of imperfect competition of the second row of equation (1). We model mark-up pricing in our price equation (P). We assume that after

participating in EU's single market price competition increases and hence, reduces the market power of incumbent firms in BG and RO. This pricing behaviour can be detected empirically in the old EU member states after creating the single market in 1993 (see Badinger, 2007). This reduces the mark-up on unit labour costs and hence dampens inflation.

Ad iii and iv) "Accumulation effects": Only one accumulation or growth effect via the capital augmenting effect of real gross fixed investment is predicted theoretically in the third row of equation (1). However, the equation does not explain how investments are induced. In our investment equation (I) we explicitly try to explain changes in investment by FDI inflows (FDI) and by transfers out of the EU budget (here we use only the structural funds transfers in percent of GDP – the variable COH) for improving the infrastructure. Via the GDP equation additional investments stimulate real GDP. With this modelling approach we combine the effects of the third and fourth row of equation (1). Besides the growth enhancing effect of trade opening (X+M) we also consider the positive link of changes of research and development for GDP growth. Hence, we consider the primary message of the new endogenous growth theory of trade (see e.g. Romer, 1990; Grossman and Helpman, 1991). Changes in the share of research and development in GDP (R&D) stimulate productivity and via the GDP equation also GDP growth.

From the hitherto existing practical experience with the single market program we know that newcomers in the single market experienced a striking productivity shock in the first

adjustment phase. We implement such a transitional shock exogenously into our productivity equation (PR) by adjusting the residual accordingly (see Table 6).

Ad v) “Location or globalisation effects”: Integration of unevenly developed economies induce stark factor movements which may dominate trade effects. In the case of EU enlargement one can speak of a “mini-globalisation” as a subset of the world-wide globalisation.

(1) *“Migration effects”:* According to Borjas (1995) migration of labour may lead to an “immigration surplus” – i.e. a welfare gain - in the recipient country and – as a mirror image – one must conclude that it leads to a “migration loss” or welfare loss in the country from which labour emigrates. We model these effects in the equation for employment (E) and in those for the unemployment rate (U) in a reduced form. In both cases changes in the labour force via migration have a positive (negative) impact on the respective variables in the host (sender) countries of migrants. As in the case of EU’s 2004 enlargement, transitional arrangements⁹ concerning the free movement of labour were negotiated in the accession treaties with BG and RO. We assume that only after 7 years, i.e. from 2014 onwards labour can freely migrate from BG and RO to EU15, EU10N and AT.

(2) *“FDI flows”:* The opening-up of Eastern Europe created a new region of “emerging markets” nearby the western European countries. Statistical data by the Austrian National Bank (OeNB) show that the return on equity (RoE) of FDIs in Eastern Europe increased much faster and they are higher than those achieved in the old EU countries since 1989 (see Altzinger, 2006; Fuchs, 2006). FDI inflows in BG and RO help to improve investment (see our investment equation I) and hence stimulate GDP growth. The FDI net outflows of the EU15 and that of AT are modelled explicitly as determined by the weighted GDP growth in the partner countries of the enlarged EU.

Ad vi) “Euro participation effects”: The stylized GUT of enlargement is not able to capture the more complex effects involved if an EU member participates in the EMU. As we discussed earlier, however, we can – due to reduced transaction costs - expect similar pro-trade effects in the new EU member states when introducing the Euro. In order to take account of the possible macro-economic effects of the Euro zone participation we estimated a Taylor rule for BG and RO explaining the setting of the short-term interest rates (RS). In case of a future Euro zone participation - which requires to fulfilment of the Maastricht

⁹ The exact transitional provisions for the free movements for workers in the case of the 2004 enlargement can be found on the homepage of the European Commission: <http://ec.europa.eu/social/main.jsp?catId=507&langId=en> and in the case of the 2007 enlargement: <http://ec.europa.eu/social/main.jsp?catId=508&langId=en>

convergence criteria – one could substitute the national Taylor rule in BG and RO by the ECB’s Taylor rule, which explains monetary policy for the Euro zone. The long-term interest rates, which are also a determinant of GDP growth, are linked to the change in the short-term interest rates. Euro area participation may also imply additional economic adjustment mechanisms: a reduction of exchange rate uncertainty; more general efficiency and, hence an increase of total factor productivity (growth effects); but also fiscal restraints could dampen aggregate demand when the Stability and Growth Pact rules (SGP; see Breuss, 2007A) have to be met. A first positive overall perspective is the outcome of macro-model simulations in the case of Slovenia’s entry into the Euro zone on January 1, 2007 (see Neck and Weyerstrass, 2007).

Models for Bulgaria and Romania: In addition to the explicit implementation of all of the possible integration effects the macro models for BG and RO are closed by explaining GDP growth (Y) with the usual economic variables (productivity, investment, employment, unemployment) as well as the policy variables (fiscal and monetary policy stance). GDP growth then is linked with the unemployment rate (inverted Okun’s law), the latter with wage bargaining (Phillips curve). The budget balance is also connected with the overall economic development and the latter determines the public debt dynamics. For BG and RO – two transition economies – we explicitly model the Balassa-Samuelson effect by explaining the real effective exchange rate (REER) by the gap of GDP per capita relative to EU15. A catching-up equation calculates the adjustment process in GDP per capita relative to those of EU15.

Models for EU15, EU10N and Austria: According to our philosophy we consider the integration effects in the old EU member states only as derived ones. The trade relations of EU15 with BG (0.2% of total exports) and RO (0.6%) and those of the EU10N (0.4% and 1.6% respectively) and even those of AT (0.5% and 1.5% respectively) are too small as one could expect a considerable direct integration impact in the old EU member states. Therefore we model only spill-overs from BG and RO to the old EU member states via GDP equations with weighted GDP growth’s of BG and RO as explanatory variables.

As already mentioned, we also model net FDI outflows (FDINET) from the EU15 and from AT as determined by GDP growth in the partner countries, and hence also in BG and RO. In the case of *Austria* we also explain the declining wage share (functional income distribution – the variable LQ) by increased net FDI outflows (most of which are connected with the new opportunities in the new emerging markets of the new EU member states in Eastern Europe).

This reduced form equation tries to capture in a nutshell the strong link between changes in product prices and that of factor prices predicted by the Stolper-Samuelson theorem in the case of trade liberalization. Accordingly, one can expect that after opening-up of the markets of Eastern Europe due to the trade liberalization with the EAs, the relative factor prices (rental price to wages) of the capital-abundant countries of the old EU15 (and hence also that of AT) increased (resulting in a decline in the wage share) whereas the relative factor prices of the labour-abundant countries in the new EU member states in Eastern Europe must have decreased (see Breuss, 2007D). Hand in hand with the income distribution effect of trade liberalization, the accelerating net FDI outflows from AT into the new EU member states enforced the pressure on the wage shares. An auxiliary equation calculates Austria's income performance relative to that of EU15.

4.2 Model inputs

The integration effects in BG and RO are simulated by considering 7 scenarios (see Table 6). We have to differentiate between a pre-accession phase and the EU membership phase proper. The integration process into the EU starts with a pre-accession phase in which the candidate countries are supported with several financial aids (ISPA, SAPARD etc.) out of the EU budget. Trade integration already takes place before becoming an EU member. Trade between the old EU and the CEECs was already liberalized via the EAs in an asymmetric manner. Tariffs on EU's imports from BG and RO were abolished already in 1997, while the tariffs on imports from the EU in the latter countries were eliminated in 2002. Being an EU candidate country makes these economies attractive and secure for FDIs. With EU accession the new members are participating in the CU of the EU implying an adjustment of their national tariffs to EU's Common External Tariff (CET).

Table 6: Model inputs for simulating integration effects

Scenarios	Integration effects	Pre-accession period 2000-2006	EU membership 2007-2020
<i>Inputs in the models for BG and RO</i>			
1	Trade effects	<i>Exports (X):</i> since 2004 EU25 instead of EU15 <i>Imports (M):</i> since 2000 more openness due to EA liberalization (same inputs in BG and RO)	<i>Exports (X):</i> since 2007 EU27 instead of EU15 <i>Imports (M):</i> since 2007 additional openness due participation in EU's CU and single market in BG and RO
2	Investment effects of FDI	<i>FDI inflows:</i> since 2000 2% of GDP more in BG (+½% in RO)	<i>FDI inflows:</i> after 2007 petering out of this process
3	Investment effects of structural funds transfers	<i>COH transfers:</i> no input	<i>COH transfers:</i> since 2007 ½% of GDP more with declining tendency
4	Productivity stimulating R&D	<i>R&D:</i> no input	<i>R&D:</i> since 2007 0.1 % of GDP (BG) and 0.25% of GDP (RO) higher
5	Mark-up pricing	<i>MUP:</i> no input	<i>MUP:</i> since 2007 5% lower mark-ups with declining tendency in BG and RO
6	Exogenous productivity shock	<i>PR_A:</i> no input	<i>PR_A:</i> since 2007 to 2010 an increase in productivity by ½% in BG and 1% in RO with declining tendency
<i>Inputs in the models for BG and RO and in AT, EU15 and EU10N</i>			
7	Migration effects	<i>LS:</i> no input	<i>LS:</i> since 2014 1% of labour force migrates from BG (-36.000) and RO (-92.000) to AT (20%), to EU15 (70%) and to EU10N (10%)

Model inputs refer to an integration scenario in comparison with a baseline scenario without EU integration; for the detailed model inputs, see Appendix B.

Prior to EU accession the import tariffs in RO (19%) were higher than in BG (12%), whereas EU's CET was around 6%. Also the tariffs for agricultural products were much higher in both countries than in the EU. Besides becoming a member of the CU of the EU the newcomers enter the single market what implies a productivity shock and more competition and, therefore, a dampening effect on prices. The new member states have better access to the research framework programs of the EU and – because they are poor countries – are eligible to receive structural funds transfers out of the EU budget.

The exact quantitative inputs used in the simulations of the 7 integration scenarios are collected in Appendix B. In some cases the inputs are the same in both countries, in others we differentiate between BG and RO. Ex ante, one never knows the intensity of the adjustments

shocks (e.g. in labour productivity) and one can only speculate about the length or the timing of the shocks. In principle, the quantification of our inputs are calibrated according to past experiences with the enlargement of EU's single market.

5. Integration effects of EU's 2007 Enlargement

Ahead of EU's fifth enlargement in 2004 a vast variety of studies were undertaken with the whole range of models available – multi- and single countries CGE models or world and single countries macro models. The great attraction to carry out such studies was founded in the novelty of the problem. Past EU enlargements primarily dealt with the integration of industrial countries with comparable levels of development (also Greece, Portugal and Spain lagged somewhat behind the old EU member states). The eastern enlargement of the EU posed several challenges. The formerly communist and planned economies firstly had to qualify as an EU candidate country according to the Copenhagen criteria (the countries had to transform to democracies, market economies and they had to adjust their legal system to EU's *acquis communautaire*). Secondly, after the systemic transformation these countries had to catch-up to EU income levels and to reorient their trade relations from the former CMEA to the EU. The EU supported this process with the help of liberalizing trade relations with the CEECs in the EAs.

Most of the model simulation studies ahead of EU's 2004 enlargement resulted in an asymmetric but win-win outcome (for an overview of the results, see European Commission, 2006). On average, both the old EU15 member states and the newly acceding countries can expect positive welfare and GDP gains. However, the gains of the new member states will be much higher than those of the old EU15 on average, sometimes at the proportion of 10:1 (see Breuss, 2002). Within the old EU15 member states those countries with more intensive trade relations already before accession (like Austria and Germany) can also expect higher welfare gains than those countries at the periphery of the EU (like Portugal and Spain) which nearly do no trade with the CEECs. The latter even might lose in the enlargement game.

In the case of EU's 2007 enlargement by Bulgaria (BG)¹⁰ and Romania (RO) we can expect a similar pattern as in the 2004 enlargement. The newcomers will gain the most, Austria (AT)

¹⁰ One of the lasting problems in connection with the 2007 enlargement is corruption. The unsuccessful fight against corruption forced the European Commission to cancel financial aid in the case of Bulgaria. On 26 November 2008, Bulgaria lost 220 million Euro of pre-accession funding after the European Commission confirmed its July decision to bar two agencies from handling Phare money. This came after the European Commission adopted a decision to suspend roughly 500 million Euros of EU funding when it released its monitoring report on Bulgaria on 23 July 2008. Similar problems still exist in Romania. However, so far the European Commission only warned Romania because of the shortcomings in judicial reforms and the fight against corruption (see EurActiv: <http://www.euractiv.com/en/enlargement>). Transparency International in its

will profit more from spill-overs than EU15 and the 10 new EU member states, which joined the EU in 2004 (EU10N).

5.1 Bulgaria and Romania

For the new EU member states we fully modelled the expected integration effects of entering EU's single market. The macro-economic effects for some major variables are shown in Table 7. The *overall results* (all 7 scenarios combined) exhibit the following features:

- 1) Due to our input calibration the overall effects in both countries are quite similar.
- 2) The integration effects started already in the pre-accession period. Preparation for accession resulted already in a higher average annual growth of real GDP of 0.3% in BG and 0.2% in RO.
- 3) The integration effects started to accelerate with joining the EU in 2007. Calculated until 2020 we expect an average annual growth effect of real GDP of 0.6% in both countries. Real GDP will have accumulated from 2000 to 2020 by more than 9 percentage points in BG and similarly in RO.
- 4) Due to the need to adjust the efficiency of the economy to the challenge of the single market, labour productivity will increase by around ½ percentage point per year after 2007.
- 5) More competition in the single market leads to a deceleration of inflation – more in RO than in BG.
- 6) In accordance with the predictions of the Balassa-Samuelson hypothesis both countries will appreciate their currencies in real terms during the catching-up process.
- 7) The income gap vis à vis EU15 will be steadily closed – on average by around three percentage points per annum between 2007-2020.

2008 Corruption Perception Index ranks Romania in place 70 and Bulgaria in 72 (http://www.transparency.org/news_room/in_focus/2008/cpi2008). The economic impact of the lasting corruption practice in both new EU member states cannot be quantified properly but will probably have a negative impact on FDI inflows and internal economic efficiency.

Table 7: Direct Integration effects¹⁾ of EU's 2007 Enlargement in Bulgaria and Romania

Integration effects	Scale	Pre-accession period 2000-2006		EU membership 2007-2020	
		Bulgaria	Romania	Bulgaria	Romania
GDP, real	%	+0.3	+0.2	+0.6	+0.6
<i>GDP, real</i>	C%	+1.8	+1.2	+9.2	+8.9
<i>GDP, real (incl. migration)</i>	%	+0.3	+0.2	+0.5	+0.6
Investment quota (% GDP)	%	+1.5	+0.5	+0.7	+0.6
Labour productivity (PR)	%	+0.3	+0.2	+0.4	+0.5
Employment (E)	%	+0.0	+0.0	+0.3	+0.1
Wages, nominal (W)	%	+0.3	+0.1	+0.3	-0.2
Inflation rate (P)	%	+0.0	-0.0	-0.2	-0.6
Unit labour costs (ULC)	%	+0.1	-0.1	-0.2	-0.8
Unemployment rate (U)	%	-0.4	-0.0	-2.8	-0.4
Budget balance (% GDP)	%	+0.1	+0.0	+0.3	+0.1
Public debt (% GDP)	%	-0.1	-0.0	-0.2	+0.1
Interest rate, short-term	%	+0.1	+0.2	+0.2	+2.0
Interest rate, long-term	%	+0.0	+0.1	+0.0	+1.9
Export quota ²⁾ (% GDP)	%	+1.3	+1.5	+4.6	+3.5
Import quota ²⁾ (% GDP)	%	+3.2	+2.9	+12.9	+10.1
Real effective exchange rate	%	+0.1	+0.1	+0.4	+1.0
Wage share (LQ) (% GDP)	%	+0.0	+0.0	+0.6	+0.2
GDP p.c. relative to EU15	%	+0.2	+0.2	+3.3	+3.1

¹⁾ Without migration effects

% = annual average growth rate in % or average annual change in % of GDP; C% = cumulated deviations from the baseline in percentage points.

²⁾ Export and import quota refer to total exports and imports of goods and services.

Source: Own simulations with the integration models of Appendix A

8) Like in other less developed countries joining the EU (e.g. Greece, Portugal and Spain) we can expect that the current account balance will further deteriorate in BG and RO as the import quotas increase much faster than the export quotas. BG starts with a deficit in the current account of 14% of GDP in 2007, RO with one of 12% of GDP.

9) The policy variables – budget balance, debt to GDP ratio, as well as interest rates (with the exception of RO) – are not very much affected by joining the EU.

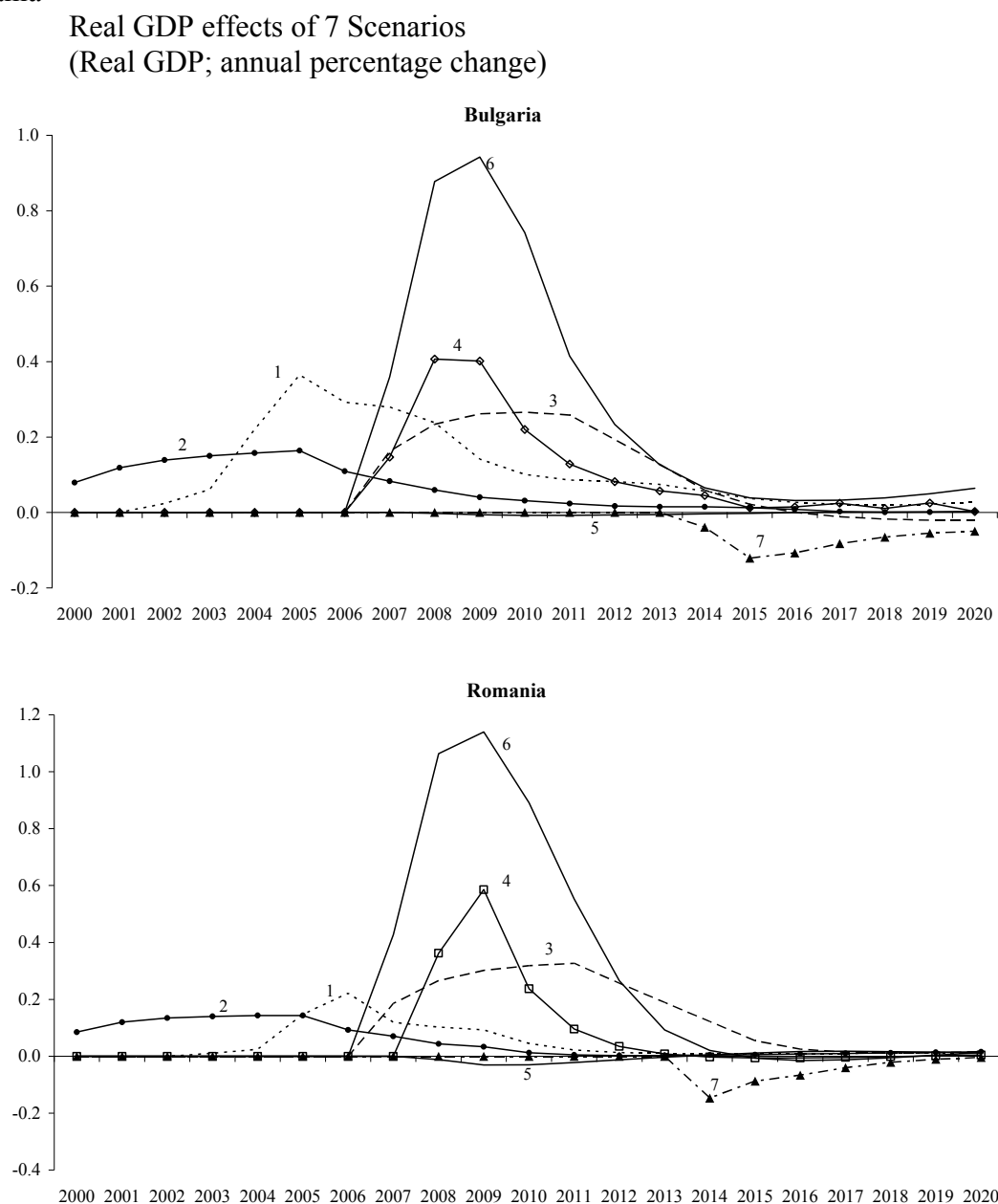
10) Due to higher GDP growth, the unemployment rate declines.

If one breaks down the overall GDP effects into the 7 *integration scenarios* (Table 6 and Appendix B) one recognises the following features:

1) Contrary to the postulates of some of the literature of the endogenous growth theory (e.g. Romer, 1990; Rivera-Batiz and Romer, 1991) and in accordance with empirical results of the past EU integration experiences (see Badinger, 2005), the growth effects of integration are

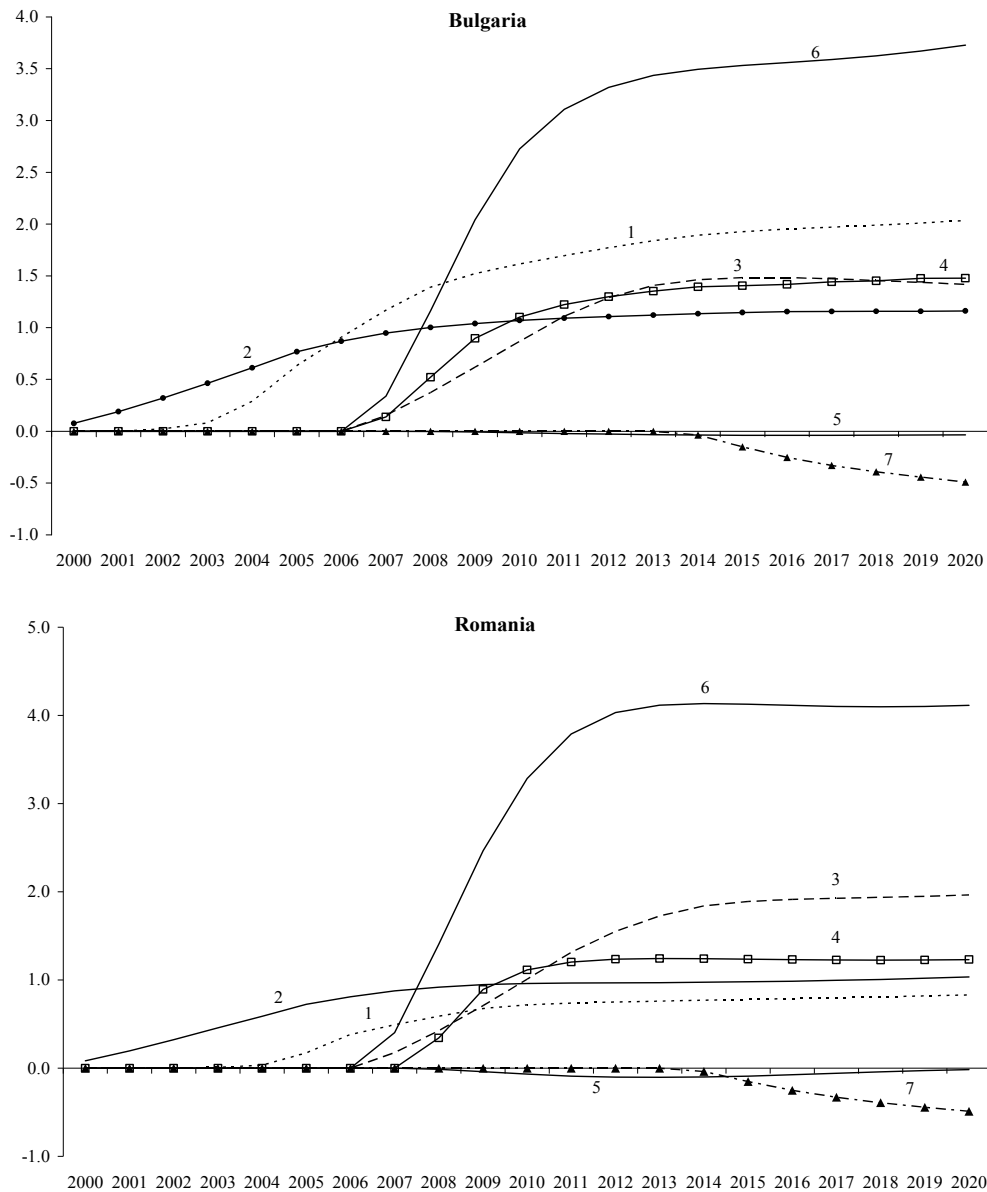
only short-lived. EU integration means a temporary shock to the level of GDP, which translates in a jump in GDP growth rates but does not lead to a permanent steady-state increase of growth. This pattern is replicated here in the case of BG and RO in Figure 1.

Figure 1: Short-term growth impact effects of 2007 EU's enlargement in Bulgaria and Romania



Scenarios: 1 = trade effects, 2 = investment effect of FDI, 3 = investment effect of structural funds, 4 = productivity effect of R&D, 5 = Mark-up pricing; 6 = exogenous productivity adjustment shock, 7 = migration effect.

Figure 2: Cumulative long-run effects of 2007 EU's enlargement in Bulgaria and Romania
Real GDP effects of 7 Scenarios
(Real GDP; cumulative deviations from baseline in %)



Scenarios: 1 = trade effects, 2 = investment effect of FDI, 3 = investment effect of structural funds, 4 = productivity effect of R&D, 5 = Mark-up pricing; 6 = exogenous productivity adjustment shock, 7 = migration effect.

2) The biggest isolated GDP growth shock stems from the exogenously implemented productivity shock (scenario 6). As we do not know ex ante how strong this shock might be and how long it will last, we calibrated it as such that it is somehow similar in both countries, with a slightly stronger impact in RO because the productivity performance was weaker than in BG ahead of EU accession. Anyway, we distributed the shock only over the period 2007 to 2010 and made sure that it dies away later on. Of course, in the case of the PR shock one

could also consider more or less impact on the economies. Here, we inputted only modest shocks.

3) The trade induced GDP growth effect (via more stimulated productivity growth) peters out relatively fast after EU accession.

4) The mark-up pricing behaviour has no impact on GDP.

5) Migration exerts – as expected – a negative effect on GDP (“migration loss”), starting with 2014 when the EU opens its labour markets completely. The simulation exercise of scenario 7 is only a tentative one, maybe considering a too strong migration effect when assuming that 1% of the labour force in both countries could emigrate in each year, starting in 2014.

Figure 2 shows the resulting long-run cumulative level effects of GDP for the 7 integration scenarios in both countries. Again, the assumed exogenous productivity effect is the strongest single integration effect.

5.2 Spill-overs to Austria, EU15 and EU10N

As mentioned earlier the old EU member states are affected by the accession of BG and RO only on an indirect way via trade spill-overs and factor movements (FDI outflows and labour immigration). The results, collected in Table 8, exhibit the following features:

1) *Austria*, which on average trades more with BG and RO than the *EU15* and *EU10N* can also expect somewhat higher GDP gains: 0.03% additional annual GDP growth in the period 2007-2020, compared to 0.01% in *EU15* and *EU10N*, respectively.

2) Derived from the slightly positive GDP effects we also get the expected improvement in the labour market and more net FDI outflows.

3) The further process of EU’s “mini-globalisation” by an ongoing enlargement towards ever poorer countries implies a further (slight) deterioration of Austria’s income distribution, i.e. a shrinking wage share.

Table 8: Indirect Integration effects¹⁾ of EU's 2007 Enlargement in Austria, EU15 and EU10N

Integration effects	Scale	Pre-accession period 2000-2006			EU membership BG, RO 2007-2020		
		Austria	EU15	EU10N	Austria	EU15	EU10N
GDP, real	%	+0.03	+0.00	+0.00	+0.03	+0.01	+0.01
<i>GDP, real</i>	<i>C%</i>	<i>+0.10</i>	<i>+0.02</i>	<i>+0.01</i>	<i>+0.50</i>	<i>+0.18</i>	<i>+0.10</i>
<i>GDP, real</i> (incl. migration)	%	+0.03	+0.00	+0.00	+0.05	+0.02	+0.01
Employment (E)	%	+0.00	+0.00	+0.00	+0.00	+0.01	+0.00
Unemployment rate (U)	%	-0.01	+0.00	+0.00	-0.03	-0.09	-0.01
FDInet (% GDP)	%	+0.01	+0.00	-	+0.04	+0.01	-
Wage share (LQ)	%	-0.03	-	-	-0.10	-	-
GDP p.c. relative to EU15	%	+0.03	-	-	+0.33	-	-

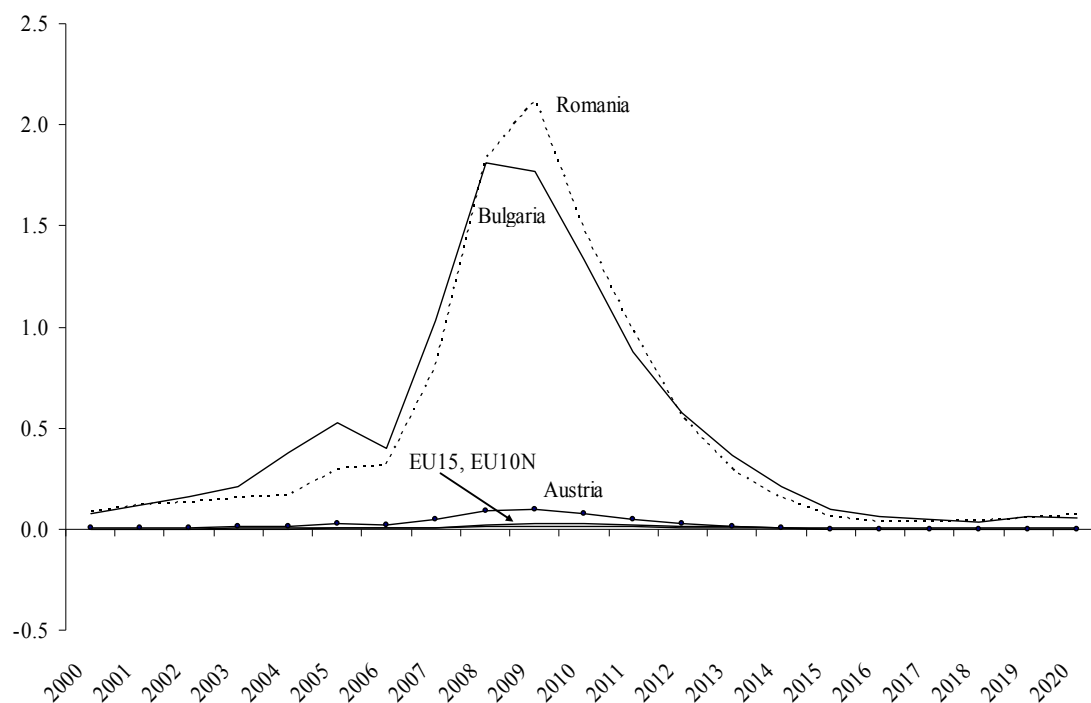
¹⁾ Without migration effects

% = annual average growth rate in % or average annual change in % of GDP; C% = cumulated deviations from the baseline in percentage points.

Source: Own simulations with the integration models of Appendix A

Figure 3: Short-term overall integration Effects of EU's 2007 Enlargement: BG, RO, AT, EU15

and EU10N
(Real GDP; annual percentage change)



As already mentioned before, we cannot expect a permanent increase of steady-state GDP growth. Instead, we foresee a temporary jump in GDP growth rates in BG and RO and consequently also in a much alleviated manner in AT, EU15 and EU10N (see Figure 3).

Figure 4: Long-run overall integration Effects of EU's 2007 Enlargement: BG, RO, AT, EU15 and EU10N (Real GDP; cumulative deviations from baseline in %)

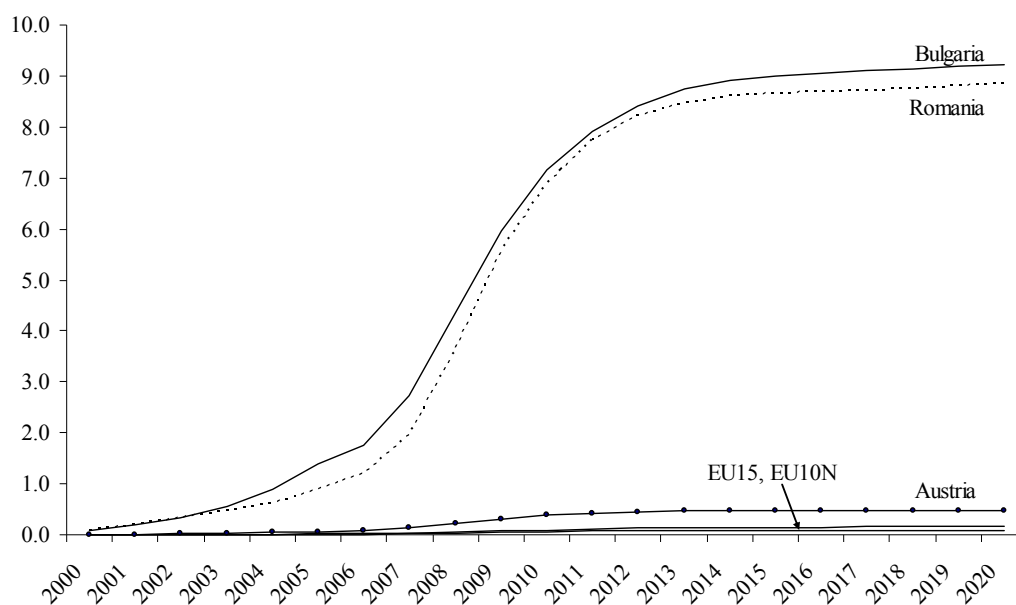
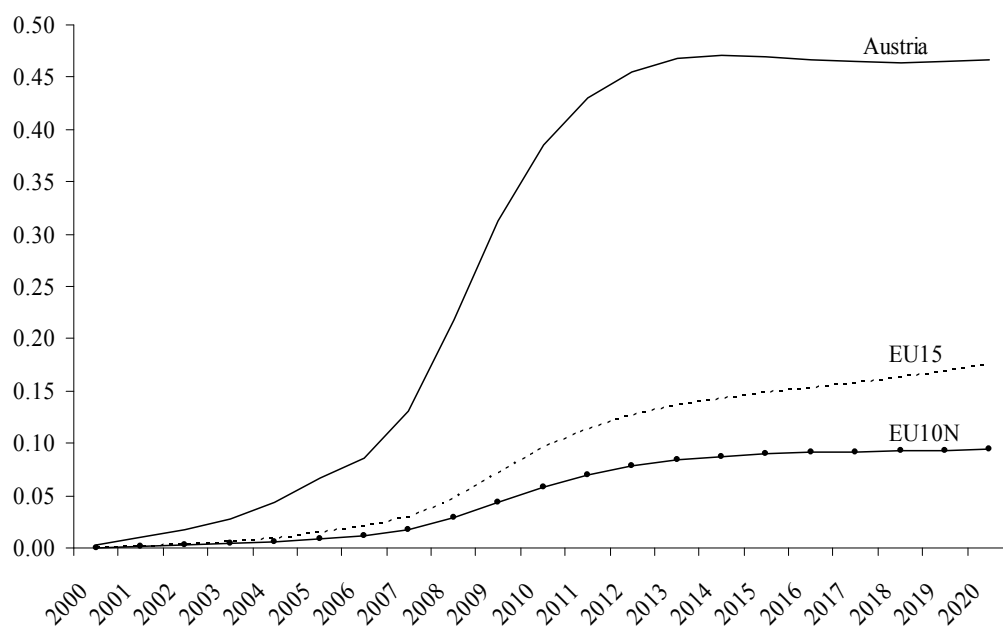


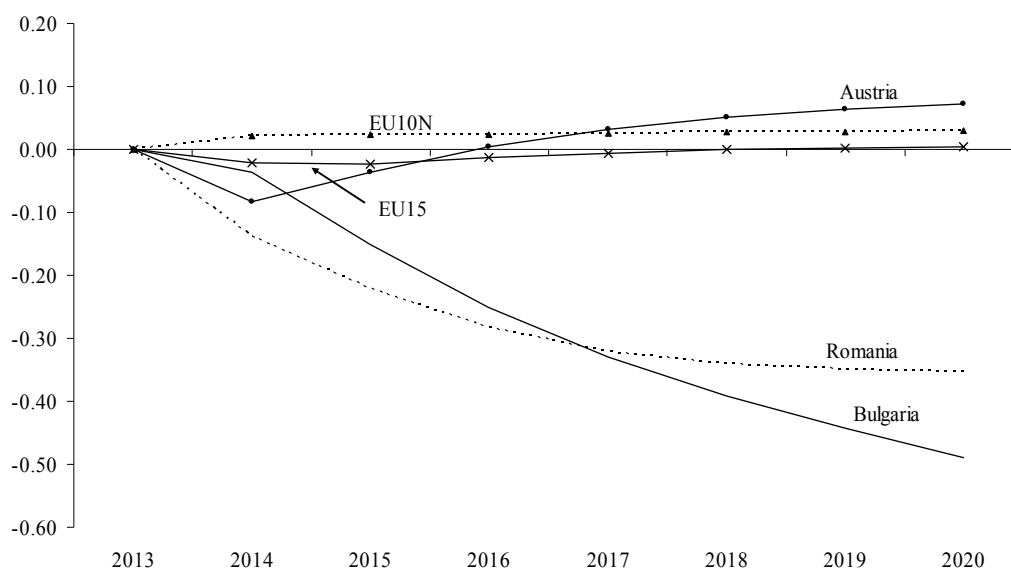
Figure 5: Long-run overall integration Effects of EU's 2007 Enlargement: AT, EU15 and EU10N (Real GDP; cumulative deviations from baseline in %)



The long-run level effects of the cumulated real GDP due to EU' 2007 enlargement are depicted in Figure 4. Calibrated as such that both countries, BG and RO can expect similar

long-run GDP effects, we see BG slightly ahead in the cumulated GDP in 2020. Figure 4 nicely shows, that also EU's 2007 enlargement may be a win-win situation. The gains in BG and RO are relative to, say Austria in the order of 20:1. In order to identify the mini-integration effects in AT, EU15 and EU10N we portray them in Figure 5.

Figure 6: Migration Effects of EU's 2007 Enlargement: BG, RO, AT, EU15 and EU10N (Real GDP; cumulative deviations from baseline in %)



Assumption: after the end of the seven year transitional arrangement concerning the free movement of labour, migration starts in 2014, amounting to 1% of labour force leaving BG and RO for the host countries with the following shares: AT (20%), EU15 (70%) and EU10N (10%).

Finally, we show the results of the assumed *migration* in 2014 (scenario 7) in Figure 6. As expected, we replicate the “immigration surplus” in AT, EU15 and EU10N and the “migration loss” in BG and RO¹¹. Although, for only demonstrative purposes we assumed that starting in 2014 1% of the labour force of BG and RO will leave their countries and migrate to AT, EU15 or EU10N, the GDP effects are small: -0.07% real GDP p.a. in BG and -0.05% in RO; +0.03% in AT and practically zero in EU15 and EU10N.

¹¹ In a study on the economic impact of migration flows following the 2004 enlargement process D’Auria et al. (2008) achieve similar results: those countries which opened their labour markets right from the beginning (like Ireland, the UK and Sweden) gained the most measured in cumulative real GDP over the period 2004-2007. The sender countries (primarily Poland), in contrast, lost real GDP. In the first four years of enlargement roughly 1 million citizens moved from the 10 new member states to the 15 old member states. The UK received 532.000 persons, Ireland 162.000, Germany 96.000, Spain 67.000, Italy 32.000 and Austria 26.000. In Ireland the cumulative real GDP increase (+4.2%) was highest, followed by UK (+1%) and Austria (+0.4%). In the other old member states the “immigration surplus” amounted to around +0.1% or less. In the sender countries the largest GDP loss was exhibited in Latvia (-3.5%), Lithuania (-4.7%) and Poland and Slovakia (each -2.1%). In the remaining new member states the “migration loss” was less pronounced (see D’Auria et al., 2008, p.18).

6. Conclusions

A first evaluation of the grand fifth EU enlargement lead to the following basic findings:

- In most of the new member states the economy grew faster since 2004 or 2007 than before.
- The recent enlargement resulted statistically in an “impoverishment” of the enlarged EU, i.e. the average GDP per capita decreased.
- The new member states increased trade with the old member states, but more so trade was created within each other. Also the EU 15 countries redirected their trade flows towards the new member states at the cost of reducing intra-EU trade.
- Instead of busy trade activities since 2004 the old EU member states could exploit much better their comparative advantages than the new member states theirs. This is reflected in a continuous improvement of the trade and current account balances in trade of the old EU member states in trade with the new ones. As a mirror image the current account balances of the new member states in trade with the old ones deteriorated.
- With the exception of Slovenia (2007), Malta and Cyprus (2008) and Slovakia (2009) the new member states are not yet ready to fully participate in EMU, partly due to too high inflation rates and partly because of too big public deficits. Slovakia will enter the Euro area in 2009. Then, 16 out of 27 EU Member states will possess the Euro.
- The evaluation of the integration effects (in the past and in the long-run future) of Bulgaria and Romania with a simple macro-economic integration model trying to encompass as many of the theoretically predicted integration effects possible leads to the following results:
 Bulgaria and Romania gain much more from EU accession than the incumbents by the proportion of 20:1. In the time up to 2020, Bulgaria and Romania can expect a considerable overall integration gain, amounting to additionally ½ percentage point more real GDP growth per annum. The incumbent EU member states will profit only slightly from this last step of EU enlargement. Due to more intensive trade relations, Austria will gain somewhat more (+0.05%) than the average of EU15 (+0.02%) and the 10 new EU member states (+0.01%) which joined the EU in 2004.
- The prototype model presented and applied here for Bulgaria and Romania may in principle also be applicable in the case of further EU enlargements toward the countries of the Western Balkan (e.g. Croatia) and Turkey.

Appendix A: Estimated Integration Model for Bulgaria and Romania with spill-overs to Austria, EU15 and EU10N

BULGARIA:

GDP growth %:

$$Y_BG\% = 0.47 + 0.86*(PR_BG\%+PR_BG\%(-1))/2 + 0.03*I_BG + 0.46*E_BG\% + 0.20*BD_BG - 0.11*BD_BG(-1) - 0.09*D(U_BG) - 0.15*(RL_BG(-1)-P_BG\%(-1))$$

Investment in % of GDP

$$I_BG = 1.17 + 0.90*I_BG(-1) + 0.36*FDI_BG(-1) + 0.03*COH_BG_GD$$

Labour productivity growth %:

$$PR_BG\% = 0.55 + 0.61*Y_BG\% + 4.96*D(R\&D_BG) + 0.05*D(X_BG+M_BG)$$

Total employment (in 1.000):

$$E_BG = 994.74 + 0.29*(LS_BG+MIGR_BG) + 29.53*Y_BG - 74.65*PR_BG + 0.31*E_BG(-1)$$

Wage bargaining – Phillips curve:

$$W_BG\% = 0.72 - 0.40*D(U_BG) + 0.74*P_BG\% + 1.07*PR_BG\% + 0.04*W_BG\%(-1))$$

Mark-up pricing:

$$P_BG = 0.50 + 0.47*MUP_BG*ULC_BG + 0.81*P_BG(-1)$$

Unemployment rate % (inverted Okun's law):

$$U_BG = 3.23 + 0.92*U_BG(-1) - 0.54*Y_BG\% + 0.04*D(LS_BG+MIGR_BG)$$

Budget balance in % of GDP:

$$BD_BG = -0.90 + 0.27*Y_BG\% + 0.35*BD_BG(-1)$$

Public debt dynamics:

$$DB_BG = -BD_DB + (RL_BG - P_BG\% - Y_BG\%)*DB_BG(-1) - DB_BG(-1)$$

Taylor rule for short-term interest rate %:

$$RS_BG = -3.13 + 0.33*(Y_BG\%(-1))-3) + 0.001*(P_BG\%-2) + 0.85*RS_EU15 + 0.61*RL_BG$$

Long-term interest rate %:

$$RL_BG = 2.31 + 0.08*RS_BG + 0.48*RL_BG(-1)$$

Export (of goods and services) share in % of GDP:

$$D(X_BG) = -6.03 + 5.76*(0.46*Y_EU15\%+0.02*Y_AT\%+0.05*Y_EU10N\%+0.038*Y_RO\%) - 0.22*REER_BG\% + 0.27*D(D_ENLCTR)$$

Import (of goods and services) share in % of GDP:

$$LOG(M_BG) = 0.14 + 0.04*INT_BG + 0.43*LOG(REER_BG) + 0.58*LOG(X_BG)$$

Balassa-Samuelson hypothesis:

$$\text{LOG}(\text{REER_BG}) = 0.42 + 0.13 * \text{LOG}((\text{YPC_BG} / \text{YPC_EU15}) * 100) + 0.81 * \text{LOG}(\text{REER_BG}(-1))$$

GDP p.c. at 2000 PPS:

$$\text{YPC_BG} = \text{YPC_BG}(-1) * (1 + \text{Y_BG\%}) / 100$$

Catching-up of GDP p.c. to EU15 level:

$$\text{YPC_BGEU15} = (\text{YPC_BG} / \text{YPC_EU15}) * 100$$

Unit labour costs:

$$\text{ULC_BG} = (\text{W_BG} / \text{Y_BG}) * 100$$

Income distribution (wage share in % of nominal GDP):

$$\text{LQ_BG} = (\text{W_BG} / \text{YN_BG}) * 100$$

GDP at current prices:

$$\text{YN_BG} = \text{YN_BG}(-1) * (1 + (\text{P_BG\%} + \text{Y_BG\%}) / 100)$$

ROMANIA:

GDP growth %:

$$\text{Y_RO\%} = -1.26 + 0.77 * (\text{PR_RO\%} + \text{PR_RO\%}(-1)) / 2 + 0.12 * \text{I_RO} + 0.29 * \text{E_RO\%} + 0.002 * \text{BD_RO} + 0.20 * \text{BD_RO}(-1) - 0.25 * \text{D}(\text{U_RO}(-1)) - 0.79 * (\text{RL_RO}(-1) - \text{P_RO\%}(-1))$$

Investment in % of GDP

$$\text{I_RO} = 13.56 + 0.15 * \text{Y_RO\%} + 2.25 * \text{COH_RO_GDP} + 1.05 * \text{FDI_RO}$$

Labour productivity growth %:

$$\text{PR_RO\%} = 1.01 + 0.61 * \text{Y_RO\%} + 3.43 * \text{D}(\text{R\&D_RO}(-1)) + 0.04 * \text{D}(\text{X_RO}(-1) + \text{M_RO}(-1))$$

Total employment (in 1.000):

$$\text{E_RO} = 1794.74 + 0.34 * (\text{LS_RO} + \text{MIGR_RO}) + 23.42 * \text{Y_RO} - 178.61 * \text{PR_RO} + 0.39 * \text{E_RO}(-1)$$

Wage bargaining – Phillips curve:

$$\text{W_RO\%} = 4.86 - 4.73 * \text{D}(\text{U_RO}) + 0.81 * \text{P_RO\%} + 0.60 * \text{PR_RO\%}$$

Mark-up pricing:

$$\text{P_RO} = 3.94 + 0.24 * \text{MUP_RO} * \text{ULC_RO} + 0.71 * \text{P_RO}(-1)$$

Unemployment rate % (inverted Okun's law):

$$\text{U_RO} = 2.12 + 0.80 * \text{U_RO}(-1) - 0.13 * \text{Y_RO\%} + 0.001 * \text{D}(\text{LS_RO} + \text{MIGR_RO})$$

Budget balance in % of GDP:

$$\text{BD_RO} = -1.86 + 0.08 * \text{Y_RO\%}$$

Public debt dynamics:

$$\text{DB_RO} = -\text{BD_RO} + (\text{RL_RO} - \text{P_RO\%} - \text{Y_RO\%}) * \text{DB_RO}(-1) - \text{DB_RO}(-1)$$

Taylor rule for short-term interest rate %:

$$RS_RO = -2.84 + 0.56*(Y_RO\%(-1)-3) + 0.08*(P_RO\%-2) + 0.57*RL_RO + 0.33*RS_RO(-1)$$

Long-term interest rate %:

$$RL_RO = 0.22 + 0.46*RS_RO + 0.53*RL_RO(-1)$$

Export (of goods and services) share in % of GDP:

$$D(X_RO) = -3.03 + 2.53*(0.6*Y_EU15\%+0.03*Y_AT\%+0.08*Y_EU10N\%+0.027*Y_BG\%) - 0.15*REER_RO\% + 0.33*D(D_ENLCTR)$$

Import (of goods and services) share in % of GDP:

$$LOG(M_RO) = 0.61 + 0.04*INT_RO + 0.11*LOG(REER_RO) + 0.80*LOG(X_RO)$$

Balassa-Samuelson hypothesis:

$$LOG(REER_RO) = -0.35 + 0.25*LOG((YPC_RO/YPC_EU15)*100) + 0.89*LOG(REER_RO(-1))$$

GDP p.c. at 2000 PPS:

$$YPC_RO = YPC_RO(-1)*(1+Y_RO\%/100)$$

Catching-up of GDP p.c. to EU15 level:

$$YPC_ROEU15 = (YPC_RO / YPC_EU15) * 100$$

Unit labour costs:

$$ULC_RO = (W_RO / Y_RO) * 100$$

Income distribution (wage share in % of nominal GDP):

$$LQ_RO = (W_RO / YN_RO) * 100$$

GDP at current prices:

$$YN_RO = YN_RO(-1)*(1+(P_RO\% + Y_RO\%) / 100)$$

AUSTRIA:

GDP growth %:

$$Y_AT\% = 0.79 + 0.52*(0.59*Y_EU15\%+0.125*Y_EU10N\%+0.05*Y_BG\%+0.015*Y_RO\%) + 0.25*E_AT\% - 1.11*D(U_AT) + 0.12*Y_AT\%(-1)$$

Total employment (in 1.000)

$$E_AT = 360.37 + 0.51*(LS_AT+MIGR_AT) + 0.38*E_AT(-1) + 0.08*Y_AT$$

Unemployment rate % (inverted Okun's law):

$$U_AT = 1.02 + 0.85*U_AT(-1) - 0.18*Y_AT\% + 0.005*D(LS_AT+MIGR_AT)$$

FDI net outflow (in % of GDP)

$$\text{FDINET_AT} = -0.91 + 0.45*(0.59*Y_EU15\%+0.125*Y_EU10N\%+0.05*Y_BG\%+0.015*Y_RO\%) + 0.44*\text{FDINET_AT}(-1)$$

Income distribution (wage share in % of nominal GDP):

$$\text{LQ_AT} = 49.70 - 2.70*\text{FDINET_AT}$$

GDP p.c. at 2000 PPS:

$$\text{YPC_AT} = \text{YPC_AT}(-1)*(1+Y_AT\%)/100$$

Relationship of GDP p.c. to EU15 level:

$$\text{YPC_ATEU15} = (\text{YPC_AT} / \text{YPC_EU15}) * 100$$

EU15:

GDP growth %:

$$Y_EU15\% = 1.55 + 0.14*(Y_AT\%+Y_AT\%(-1))/2 + 0.47*E_EU15\% - 0.63*D(U_EU15) - 0.05*Y_EU15\%(-1)$$

Total employment (in 1.000)

$$E_EU15 = 39385.45 + 0.19*(LS_EU15+MIGR_EU15) + 0.31*E_EU15(-1) + 4.82*Y_EU15$$

Unemployment rate % (inverted Okun's law):

$$U_EU15 = 0.62 + 1.04*U_EU15(-1) - 0.55*Y_EU15\% + 0.17*D(LS_EU15+MIGR_EU15)/1000$$

FDI net outflow (in % of GDP)

$$\text{FDINET_EU15} = 0.07 + 0.27*(0.60*Y_EU15\%+0.023*Y_AT\%+0.053*Y_EU10N\%+0.002*Y_BG\%+0.006*Y_RO\%) + 0.71*\text{FDINET_EU15}(-1)$$

GDP p.c. at 2000 PPS:

$$\text{YPC_EU15} = \text{YPC_EU15}(-1)*(1+Y_EU15\%)/100$$

EU10N:

GDP growth %:

$$Y_EU10N\% = 3.25 + 0.25*(0.55*Y_EU15\%(-1)+0.04*Y_AT\%+0.004*Y_BG\%+0.016*Y_RO\%) + 0.48*E_EU10N\% - 0.43*D(U_EU10N(-2)) + 0.21*Y_EU10N\%(-1)$$

Total employment (in 1.000)

$$E_EU10N = -13180.04 + 1.30*(LS_EU10N+MIGR_EU10N)$$

Unemployment rate % (inverted Okun's law):

$$U_EU10N = 1.47 + 0.89*U_EU10N(-1) - 0.14*Y_EU10N\%(-1) + 0.002*D(LS_EU10N(-1)+MIGR_EU10N(-1))/1000$$

GDP p.c. at 2000 PPS:

$$YPC_EU10N = YPC_EU10N(-1)*(1+Y_EU10N\%/100)$$

Catching-up of GDP p.c. to EU15 level:

$$YPC_EU10NEU15 = (YPC_EU10N / YPC_EU15) * 100$$

Legend of the labels:

Label i = name of the variable for country *i*; *i* = BG, RO, AT, EU15 and EU10N.

Y = real GDP; PR = labour productivity; I = investment quota in % of GDP; E = total employment (in 1.000); BD = budget balance (in % of GDP); U = unemployment rate (in %); P = index of consumer prices; COH_GDP = structural funds transfers out of the EU budget (in % of GDP); FDI = FDI inflows (in % of GDP), R&D = expenditures on research and development (in % of GDP); LS = labour supply (in 1.000); MIGR = migrating labour (in 1.000); W = wages and salaries (at current prices); MUP = mark-up index; DB = gross public debt (in % of GDP); RL = nominal long-term interest rate (%); RS = nominal short-term interest rate (%); X = export quota (exports of goods and services in % of GDP); M = import quota (imports of goods and services in % of GDP); REER = real effective exchange rate (vis à vis EU15); YPC = GDP per capita at 2000 PPS; LQ = wage share (wages in % of nominal GDP); ULC = unit labour costs; YN = nominal GDP.

Parameter estimates for dummy variables are not reported. The model is estimated in EViews for the period 1992 to 2020. Data source: AMECO database of the European Commission with own forecasts up to 2020.

Appendix B: Quantitative model inputs of 7 scenarios in Bulgaria and Romania

(Additional effects compared to the baseline scenario without EU integration)

	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		Scenario 7			
	ENLCTR	INT	FDI		COH		R&D		MUP		PR		MIGR			
	BG+RO	BG+RO	BG	RO	BG	RO	BG	RO	BG+RO	BG	RO	BG	RO	AT	EU15	EU10N
2000	0.00	0.00	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2001	0.00	0.00	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2002	0.00	0.39	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2003	0.00	0.69	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2004	10.00	1.19	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2005	10.00	1.69	2.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2006	10.00	2.19	0.50	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0
2007	12.00	2.69	0.50	0.20	0.50	0.50	0.05	0.25	-0.03	0.60	1.00	0	0	0	0	0
2008	12.00	2.69	0.20	0.10	0.45	0.50	0.10	0.25	-0.07	0.40	0.90	0	0	0	0	0
2009	12.00	2.69	0.00	0.10	0.40	0.50	0.10	0.25	-0.06	0.30	0.60	0	0	0	0	0
2010	12.00	2.69	0.00	0.00	0.35	0.50	0.10	0.25	-0.05	0.00	0.30	0	0	0	0	0
2011	12.00	2.69	-0.10	0.00	0.30	0.50	0.10	0.25	-0.04	-0.02	0.10	0	0	0	0	0
2012	12.00	2.69	-0.20	0.00	0.10	0.30	0.10	0.25	-0.03	-0.02	0.00	0	0	0	0	0
2013	12.00	2.69	-0.20	0.00	0.00	0.20	0.10	0.25	-0.02	-0.03	0.00	0	0	0	0	0
2014	12.00	2.60	-0.20	0.00	-0.10	0.10	0.10	0.25	-0.01	-0.03	0.00	-36	-92	25.6	89.6	12.8
2015	12.00	2.50	-0.30	0.00	-0.10	0.00	0.09	0.25	0.00	-0.03	0.00	-36	-92	25.6	89.6	12.8
2016	12.00	2.40	-0.40	0.00	-0.10	0.00	0.10	0.25	0.00	-0.02	0.00	-36	-92	25.6	89.6	12.8
2017	12.00	2.30	-0.50	0.00	-0.10	0.00	0.09	0.25	0.00	-0.02	0.00	-36	-92	25.6	89.6	12.8
2018	12.00	2.20	-0.50	0.00	-0.10	0.00	0.10	0.25	0.00	-0.03	0.00	-36	-92	25.6	89.6	12.8
2019	12.00	2.10	-0.50	0.00	-0.10	0.00	0.08	0.25	0.00	-0.03	0.00	-36	-92	25.6	89.6	12.8
2020	12.00	2.00	-0.50	0.00	-0.10	0.00	0.09	0.25	0.00	-0.02	0.00	-36	-92	25.6	89.6	12.8

Scenarios: 1 = trade effects (ENLCTR = additional number of EU member states in the process of enlargement from EU15 to EU25 and EU27; INT = dummy for opening-up of import barriers, 2 = investment effect of FDI (change in % of GDP), 3 = investment effect of structural funds (COH; change in % of GDP), 4 = productivity effect of R&D (change in % of GDP), 5 = Mark-up pricing (mark-up – MUP decreases; %-change); 6 = exogenous productivity adjustment shock (adjustment in the residuum of the PR equation), 7 = migration effect (MIGR – in 1.000 persons).

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