
CHAPTER 5

CAN INTERNATIONAL MIGRATION SOLVE THE PROBLEMS OF EUROPEAN LABOUR MARKETS?

*Herbert Brücker*²⁰⁷

5.1 Introduction

International migration is one of the most controversial issues in the current debate on economic and social policies in Europe. On the one hand, it is blamed for unemployment and increasing inequality in the host countries; on the other, some hope that it can mitigate employment shocks and alleviate the demographic burden of Europe's rapidly ageing population. The majority of the populations in the host countries in Europe, however, perceive immigration to be a burden rather than a solution to their economic and social problems. According to the Eurobarometer survey (an opinion poll conducted twice a year in all member countries of the European Union) the attitude of the majority of natives in the EU can be summarized as follows: immigrants cause unemployment; they abuse the welfare state; and the presence of foreign nationals has reached or even exceeded its saturation point. The outcome of recent elections in Austria, Belgium, Denmark, France and the Netherlands demonstrates that hostile attitudes towards immigration are widespread in the host countries.

European migration policies over the last few decades have reflected these anxieties. Although the barriers to migration between the members of the EU and European Economic Area (EEA) have been removed to an extent which is unique among regional trade areas, immigration policies vis-à-vis non-EU and non-EEA countries have become more and more restrictive following the first oil-price shock in 1973. Non-EU and non-EEA countries have nevertheless become the main source of immigration into western Europe over the last three decades and they will become even more important in the future, due to the convergence of per capita incomes in the EU and the declining propensity to migrate within western Europe caused by ageing populations.

The restrictive approach of western Europe toward immigration from non-EU and non-EEA countries is challenged by three main trends: first, the populations in western Europe – and also in other areas of the world – are ageing rapidly. Against this background, the current structure of revenues and expenditures of the public finances and social security systems is not sustainable. Second, the skill level of immigrants and, as a consequence, their labour market performance, has deteriorated over the last decades. Restrictive migration policies have reinforced this trend, since migration has mainly comprised family reunification, humanitarian and illegal migration. Third, the restrictions to emigration have been dismantled in a region of almost 400 million people following the demise of communism in eastern Europe. Given that the average per capita GDP level in this area amounts to around 20 per cent of that in western Europe, this creates a considerable potential supply of relatively high-skilled workers for future migration.

A review of European migration policies is thus on the agenda for the next decade. The objective of this paper is to analyse the implications of a change in European migration policies on the labour market and welfare from an economic perspective. Three issues are addressed: first, whether the international migration of labour is a zero-sum game or whether it yields a net gain for the economies involved; second, how the benefits and costs of labour migration are distributed between the host and the source countries and the different factors of production; and third, whether international migration yields fiscal benefits or losses when taking into account demographic change. Although international labour migration has many facets, this paper concentrates on a few important questions, instead of covering all the relevant aspects in significantly less detail.

The paper is organized as follows: first, in order to establish the institutional and quantitative background, key facts on European migration policies, the scale of European migration in the main host and source regions, and stylized facts about the socio-economic characteristics of European migrants are presented in section 5.2. The impact of labour

²⁰⁷ The author wishes to thank Stanisława Golinowska, Ágnes Hárs, Georg Fischer, Juan Jimeno and the participants of the UNECE Spring Seminar 2002 for many useful comments. However, I am responsible for any errors and omissions in this paper.

migration on income, wages, unemployment and the distribution of income is then analysed in both the host and the source regions. In the first step, the analysis is based on the calibration of a simple equilibrium model, which allows the implications of migration to be simulated with wage rigidities and persistent unemployment, with regional wage and employment differences, and with different levels of welfare benefits. In the second step, the results of the simulations are compared with the findings of empirical studies (section 5.3). Next the fiscal implications of migration are discussed, taking the rapidly ageing populations in Europe into account. A generational accounting approach is used to analyse whether international migration can help to improve the sustainability of public finances (section 5.4). Finally, the study's findings are summarized in section 5.5.

TABLE 5.2.1

The main channels of entry into selected host countries, 1998

(Per cent of total immigrants)

	Labour migrants	Family reunification	Asylum seekers	Others ^a
France ^b	21	55	10	16
Italy ^c	50	39	3	8
Sweden ^d	2	55	21	22
Switzerland ^e	50	45	5	—
United Kingdom ^f	45	50	5	—
Australia ^g	34	26	11	29
Canada ^g	55	29	13	3
United States ^g	12	72	8	8

Source: H. Brücker, B. McCormick, G. Epstein, G. St. Paul, A. Venturini and K. Zimmermann, "Managing migration in the European welfare state", in T. Boeri, G. Hanson and B. McCormick (eds.), *Immigration Policy and the Welfare System* (Oxford, Oxford University Press, 2002), pp. 1-167; SOPEMI, OECD, *Trends in International Migration* (Paris), 2000; national statistics for Italy (average 1998-1999).

^a Including students, visitors, etc. with the exception of Switzerland and the United Kingdom. Totals do not therefore add up to 100.

^b 1996.

^c 1999.

^d 1997.

^e OECD, op. cit., p. 258, gives a different split for 1998 inflows: 31 per cent family reunion, 36 per cent employment.

^f Passenger figures excluding European Economic Area nationals in the United Kingdom. The data only include certain categories of migrants: work permit holders, spouses and refugees. The category "labour migrants" includes Commonwealth citizens with United Kingdom ancestry.

^g Inflows of permanent settlers, 1998.

TABLE 5.2.2

Net migration flows into western Europe, 1950-2000
(Thousands, per cent)

	Annual net migration saldo ^a			Cumulative net flow (+ inflow, - outflow)					
	1950-2000	1960-2000	1990-2000	1950-2000		1960-2000		1990-2000	
	Net migration rate per thousand			Thousands	Per cent of population	Thousands	Per cent of population	Thousands	Per cent of population
Austria	1.3	2.0	3.6	473	5.9	602	7.5	294	3.6
Belgium	1.0	1.0	1.5	486	4.7	400	3.9	153	1.5
Denmark	0.7	1.1	2.5	167	3.1	226	4.2	129	2.4
Finland	-0.7	-0.4	1.2	-161	-3.1	-76	-1.5	64	1.2
France	1.8	1.8	1.0	4 828	8.2	3 855	6.5	585	1.0
Germany	2.5	2.7	4.4	9 506	11.6	8 495	10.4	3 638	4.4
Greece	0.6	1.2	4.2	268	2.5	469	4.4	442	4.2
Iceland	-0.9	-1.0	-0.4	-10	-3.5	-10	-3.5	-1	-0.4
Ireland	-3.6	-1.4	2.5	-586	-15.4	-194	-5.1	91	2.4
Italy	-0.3	0.1	2.1	-741	-1.3	273	0.5	1 177	2.0
Luxembourg	5.9	6.7	10.0	107	24.5	100	22.8	42	9.7
Netherlands	1.2	1.8	2.3	840	5.3	1 004	6.3	360	2.3
Norway	0.8	1.1	2.0	163	3.6	186	4.2	88	2.0
Portugal	-3.8	-3.0	0.4	-1 799	-18.0	-1 162	-11.6	35	0.4
Spain	-0.4	-	0.9	-724	-1.8	72	0.2	358	0.9
Sweden	1.8	2.0	2.2	755	8.5	670	7.6	194	2.2
Switzerland	3.5	3.1	3.3	1 111	15.5	804	11.2	235	3.3
United Kingdom	0.1	0.4	1.4	402	0.7	941	1.6	827	1.4
EEA and Switzerland	0.8	1.3	2.2	15 085	3.9	16 652	4.3	8 712	2.2
EU-15	0.8	1.1	2.2	13 821	3.7	15 673	4.2	8 390	2.2
Southern EU ^b	-0.6	-0.1	1.7	-2 996	-2.5	-349	-0.3	2 012	1.7
<i>Memorandum items:</i>									
Australia/New Zealand	5.7	5.3	5.1	463	2.0	3 917	17.1	1 134	4.9
Japan	0.1	0.1	0.4	4 873	3.8	510	0.4	442	0.3
North America ^c	3.0	3.1	4.4	36 969	11.8	32 794	10.4	13 324	4.2

Source: United Nations Population Division, *World Population Prospects – Population Database* (<http://esa.un.org/unpp/>), 16 April 2002; author's calculations.

^a The net migration saldo is calculated as the rate of population growth minus the rate of natural population growth (crude birth rate minus crude mortality rate).

^b Greece, Italy, Portugal, Spain.

^c Canada, the United States.

TABLE 5.2.3

Foreign residents by source country, 1998
(Thousands, per cent)

	Non-nationals		of which:									
	Thousands population	Per cent of total	EU citizens		South-eastern Europe ^a		Northern Africa ^b		CEEC-10 ^c		CIS ^d	
			Thousands	Per cent of non-nationals	Thousands	Per cent of non-nationals	Thousands	Per cent of non-nationals	Thousands	Per cent of non-nationals	Thousands	Per cent of non-nationals
Austria	731	9.0	..	..	474	64.9	..	..	103 ^e	14.1	..	..
Belgium	890	8.7	560	62.8	80	8.9	153	17.1	11	1.3	3	0.4
Denmark	238	4.5	49	20.6	69	29.0	4	1.8	9	3.9	4	0.4
Finland	73	1.4	14	19.3	6	7.7	1	1.2	13	17.5	30	12.7
France	3 597	6.1	1 322	36.7	250	7.0	1 393	38.7	22 ^e	0.6	5	6.4
Germany	7 314	8.9	1 840	25.2	3 404	46.5	126	1.7	548	7.5	254	7.1
Greece	161	1.5	45	28.0	43	26.5	1	0.6	20	12.5	22	0.3
Iceland	5	1.8	2	47.1	..	..	..	..	1	17.6	..	0.1
Ireland	114	3.0	81	71.1	..	..	..	..	..^e	0.2	..	..
Italy	885	1.5	134	15.1	89	10.1	168	19.0	56	6.3	6	5.0
Luxembourg	143	32.7	128	89.6	..	..	..	..	1 ^e	0.5	..	..
Netherlands	680	4.3	188	27.7	160	23.5	141	20.8	11	1.7	5	3.5
Norway	157	3.5	64	40.8	22	13.8	2	1.1	..	..	2	0.3
Portugal	173	1.7	44	25.3	1	0.3	..	0.2	1	0.5	..	0.3
Spain	538	1.3	252	46.8	2	0.3	81	15.1	14	2.6	3	1.4
Sweden	527	6.0	178	33.8	117	22.2	3	0.5	26	5.0	7	1.3
Switzerland	1 370	19.1	827	60.4	388	28.3	11	0.8	7	0.5	6	1.1
United Kingdom	2 121	3.6	806	38.0	76	3.6	12	0.6	39	1.8	20	1.5
EEA and Switzerland	19 715	5.1	6 533	33.1	5 179	26.3	2 097	10.6	882	4.5	366	1.9
EU-15	18 023	4.8	5 594	31.0	4 727	26.2	2 084	11.6	854	4.7	336	1.9
Southern EU ^f	1 757	1.6	429	24.4	134	7.6	251	14.3	91	5.2	31	1.8

Source: Eurostat, *Yearbook* (Luxembourg) 2001; national sources; author's calculations.

^a The former SFR of Yugoslavia, Turkey.

^b Algeria, Morocco, Tunisia.

^c Accession candidate countries from central and eastern Europe.

^d Commonwealth of Independent States.

^e Estimates based on labour force survey data.

^f Greece, Italy, Portugal, Spain.

TABLE 5.2.4

Net migration flows in the source countries of European migration, 1950-2000
(Thousands, per cent)

	Annual net migration saldo ^a			Cumulative net flow (+ inflow, - outflow)					
	1950-2000	1960-2000	1990-2000	1950-2000		1960-2000		1990-2000	
	Net migration rate per thousand			Thousands	Per cent of population	Thousands	Per cent of population	Thousands	Per cent of population
Albania	-5.4	-6.2	-21.8	-661	-21.1	-668	-21.3	-690	-22.0
Turkey	-0.9	-1.0	-0.8	-1 952	-2.9	-1 977	-3.0	-513	-0.8
Former SFR of Yugoslavia ^b ...	-1.7	-1.5	-0.7	-1 599	-7.5	-1 175	-5.5	-140	-0.7
Bosnia and Herzegovina	-5.7	-5.6	-9.5	-1 039	-26.1	-857	-21.5	-350	-8.8
Croatia	-0.5	0.2	2.8	-113	-2.4	27	0.6	130	2.8
Yugoslavia	-0.2	-0.2	1.0	-78	-0.7	-88	-0.8	105	1.0
The former Yugoslav Republic of Macedonia ...	-4.3	-3.6	-1.3	-368	-18.1	-257	-12.7	-25	-1.2
South-eastern Europe ^c ...	-1.7	-1.4	-1.5	-5 810	-6.4	-3 820	-4.2	-1 343	-1.5
Bulgaria	-2.4	-2.5	-4.8	-1 008	-12.7	-843	-10.6	-392	-4.9
Czech Republic	0.3	0.3	0.8	153	1.5	116	1.1	88	0.9
Estonia	1.9	1.3	-8.5	131	9.4	73	5.2	-122	-8.7
Hungary	-0.9	-0.6	-0.5	-439	-4.4	-249	-2.5	-50	-0.5
Latvia	2.2	2.0	-5.5	264	10.9	202	8.4	-135	-5.6
Lithuania	0.4	1.3	-1.1	67	1.8	179	4.8	-39	-1.1
Poland	-0.8	-0.8	-0.5	-1 446	-3.7	-1 138	-2.9	-174	-0.4
Romania	-1.2	-1.2	-2.6	-1 210	-5.4	-1 031	-4.6	-578	-2.6
Slovakia	-0.3	-0.7	0.4	-65	-1.2	-138	-2.6	22	0.4
Slovenia	0.8	1.7	3.8	74	3.7	124	6.2	75	3.8
CEEC-10	-0.7	-0.7	-1.2	-3 483	-3.3	-2 732	-2.6	-1 297	-1.2
Belarus	-1.5	-0.5	1.4	-615	-6.0	-171	-1.7	139	1.3
Kazakhstan	-0.8	-4.0	-12.1	-549	-3.4	-2 373	-14.7	-1 991	-12.3
Russian Federation	0.4	0.8	2.2	2 880	2.0	4 289	2.9	3 234	2.2
Ukraine	0.2	0.4	-0.3	429	0.9	809	1.6	-161	-0.3
Uzbekistan	-0.4	-0.6	-1.8	-335	-1.3	-382	-1.5	-428	-1.7
CIS ^d	-	-	-0.3	412	0.1	88	-	-788	-0.3
Algeria	-2.4	-1.8	-1.4	-2 205	-7.3	-1 451	-4.8	-411	-1.4
Morocco	-2.0	-2.2	-1.5	-1 907	-6.4	-1 901	-6.4	-428	-1.4
Tunisia	-3.1	-2.5	-0.9	-982	-10.4	-688	-7.3	-83	-0.9
Northern Africa ^e	-2.3	-2.1	-1.4	-5 094	-7.3	-4 040	-5.8	-922	-1.3

Source: As for table 5.2.2.

^a The net migration saldo is calculated as the rate of population growth minus the rate of natural population growth (crude birth rate minus crude mortality rate).

^b Including Slovenia.

^c Albania, the former SFR of Yugoslavia, Turkey.

^d Commonwealth of Independent States.

^e Algeria, Morocco, Tunisia.

TABLE 5.2.5

Age distribution of migrants and natives in the EU,^a 1999
(Per cent of total population)

	Nationals	Non-nationals	
		EU	Non-EU
0-14 years	17.0	11.0	21.4
15-24 years	12.3	10.3	15.2
25-49 years	36.2	46.1	47.2
50-64 years	17.9	21.5	12.5
65 years and above	16.6	11.0	3.7
15-64 years	66.4	77.9	74.9

Source: H. Brücker, B. McCormick, G. Epstein, G. St. Paul, A. Venturini and K. Zimmermann, "Managing migration in the European welfare state", in T. Boeri, G. Hanson and B. McCormick (eds.), *Immigration Policy and the Welfare System* (Oxford, Oxford University Press, 2002); Eurostat, Labour Force Survey (Luxembourg), 1999.

^a Without Greece, Italy, Portugal and Spain.

TABLE 5.2.6

Migrants and natives with low education levels, 1996
(Ratio of persons with low education to group total)

	Total population	Definition of natives and foreigners							
		By citizenship				By immigration status			
		Nationals	EU foreigners	Non-EU foreigners	Native born	Foreign born: years since immigration			
						All	0-9	10-20	20+
Netherlands	0.28	0.27	0.32	0.60	..	..	..	..	..
Austria	0.29	0.28	0.16	0.51	0.29	0.18	(0.13)	(0.08)	0.28
Germany	0.30	0.29	0.36	0.56	..	..	..	..	..
Denmark	0.31	0.31	0.28	0.66	0.30	0.44	0.55	0.37	0.37
Finland	0.33	0.33	0.23	0.24	0.33	0.30	0.44	(0.58)	(0.24)
France	0.41	0.31	0.65	0.69	0.39	0.52	0.44	0.52	0.54
United Kingdom	0.41	0.41	0.49	0.28	0.49	0.32	0.18	0.33	0.35
Belgium	0.41	0.41	..	0.48	0.39	0.39	0.22	0.45	0.43
Greece	0.50	0.50	0.25	0.37	0.51	(0.26)	(0.17)	(0.26)	(0.33)
Ireland	0.51	0.52	0.38	0.21	0.52	0.37	0.33	0.43	0.35
Luxembourg	0.55	0.51	0.62	0.42	0.52	0.59	0.49	0.46	0.72
Italy	0.60	0.60	0.30	(0.36)	0.59	(0.44)	(0.35)	(0.41)	(0.46)
Spain	0.62	0.62	0.29	(0.37)	0.62	(0.54)	(0.42)	(0.24)	(0.32)
Portugal	0.81	0.81	(0.23)	(0.50)	0.82	(0.44)	(0.47)	(0.50)	(0.49)

Source: European Community Household Survey Panel (ECHP).

Note: Figures in brackets are affected by low response rates.

TABLE 5.2.7

Unemployment rates of nationals and non-nationals, 1996
(Per cent)

	Nationals	Non-nationals	
		EU	Non-EU
Austria	4.3	..	9.5
Belgium	7.6	13.3	35.7
Denmark	5.0	..	16.4
France	11.4	10.5	30.5
Germany	8.2	8.8	18.9
Netherlands	3.4	3.3	18.5
Sweden	7.2	..	28.4
United Kingdom	6.0	7.3	11.5

Source: As for table 5.2.5.

TABLE 5.3.1

The impact of migration on GDP and income distribution in an economy with full employment
(Percentage change at immigration (emigration) of 1 per cent of the labour force)

		Share of manual workers in the migrant population				
		1	0.7	0.5	0.3	0
Total GDP	Host country	0.64	0.68	0.70	0.72	0.75
	Source country	-0.57	-0.71	-0.80	-0.90	-1.05
	Total region	0.30	0.29	0.28	0.26	0.240
Total income of natives	Host country	0.006	0.002	0.001	0.001	0.003
	Source country	-0.003	-0.001	-0.002	-0.005	-0.013
	Total region	0.004	0.001	-	-0.001	-0.001
Total income of migrants		186.48	144.07	123.05	105.72	84.48
Wage manual workers	Host country	-1.81	-1.05	-0.54	-0.03	0.75
	Source country	0.87	0.29	-0.09	-0.47	-1.05
	Total region	0.19	0.16	0.14	0.11	0.07
Wage non-manual workers	Host country	0.64	0.18	-0.13	-0.44	-0.90
	Source country	-0.57	0.29	0.88	1.47	2.37
	Total region	0.39	0.38	0.38	0.38	0.37
Real interest rate	Host country	0.64	0.68	0.70	0.72	0.75
	Source country	-0.57	-0.71	-0.80	-0.90	-1.05
	Total region	0.30	0.29	0.28	0.260	0.24

Source: Author's calculations.

Note: See text and technical annex for the assumptions of the simulation model.

TABLE 5.3.2

The impact of migration in an economy with unemployment

Semi-elasticity of wage with respect to unemployment rate						
Manual wages		0.0	0.0	-0.4	-1.0	-1.5
Non-manual wages		$-\infty$	$-\infty$	-1.0	-1.5	-3.0
Share of manual workers in migrant population		0.7	0.3	0.7	0.7	0.7
Percentage change at an immigration (emigration) of 1 per cent of the labour force						
Total GDP	Host country	0.30	0.71	0.39	0.50	0.55
	Source country	-0.52	-1.21	-0.47	-0.56	-0.61
	Total region	0.07	0.17	0.15	0.20	0.22
Total income of natives	Host country	-0.28	0.04	-0.22	-0.11	-0.07
	Source country	0.21	-0.36	0.26	0.16	0.10
	Total region	-0.15	-0.07	-0.09	-0.04	-0.02
<i>of which:</i>						
Manual workers	Host country	-0.72	0.13	-0.92	-0.87	-0.86
	Source country	0.42	-0.67	0.52	0.43	0.38
	Total region	-0.31	-0.17	-0.40	-0.40	-0.41
Non-manual workers	Host country	-0.40	-0.46	-0.21	-0.04	0.02
	Source country	0.58	1.00	0.56	0.45	0.40
	Total region	-0.19	-0.16	-0.05	0.05	0.09
Capital owners	Host country	0.30	0.71	0.39	0.50	0.55
	Source country	-0.52	-1.21	-0.47	-0.56	-0.61
	Total region	0.07	0.17	0.15	0.20	0.22
Total income of migrants		109.35	92.21	120.09	120.74	120.98
Post-tax wage rate						
Manual workers	Host country	-0.20	-0.01	-0.48	-0.65	-0.73
	Source country	0.09	-0.16	0.25	0.28	0.27
	Total region	0.15	0.49	0.15	0.19	0.19
Non-manual workers	Host country	-0.40	-0.46	-0.19	-0.08	-0.03
	Source country	0.58	1.00	0.37	0.33	0.33
	Total region	0.15	0.49	0.15	0.19	0.19
Change of unemployment rate in percentage points						
Total unemployment rate	Host country	0.50	-0.01	0.40	0.25	0.20
	Source country	-0.29	0.53	-0.32	-0.20	-0.13
	Total region	0.11	0.26	0.04	0.03	0.03
Manual workers	Host country	1.07	0.03	0.85	0.56	0.44
	Source country	-0.41	0.67	-0.35	-0.21	-0.15
	Total region	0.20	0.46	0.11	0.10	0.09
Non-manual workers	Host country	–	–	0.05	–	-0.01
	Source country	–	–	-0.26	-0.17	-0.10
	Total region	–	–	-0.05	-0.05	-0.03

Source: Author's calculations.

Note: See text and technical annex for the assumptions of the simulation model.

TABLE 5.3.3

The impact of unemployment benefits on income in host countries, 2000
 (Percentage change at an immigration (emigration) of 1 per cent of the labour force)

	Unemployment benefits in per cent of post-tax wages			
	0	20	40	60
Total income of natives	-0.03	-0.08	-0.12	-0.17
of which:				
Manual workers	-0.65	-0.69	-0.73	-0.77
Non-manual workers	-0.01	-0.08	-0.14	-0.21
Total income of migrants	85.51	102.40	118.49	133.82
Post-tax wage rate				
Manual workers	-0.53	-0.60	-0.67	-0.73
Non-manual workers	-0.01	-0.08	-0.14	-0.20

Source: Author's calculations.

Note: The simulation is, *inter alia*, based on the following assumptions: (i) the total unemployment rate is 0.1; (ii) the unemployment rate of migrants is, for a given skill, twice as high as that of natives; (iii) the unemployment rate of manual workers is 0.15, the unemployment rate of non-manual workers is 0.066; (iv) the semi-elasticity of manual wages with respect to the unemployment rate is -1.0; (v) the semi-elasticity of non-manual wages is -1.5; (vi) the share of manual workers in the migrant population is 0.7. See text and technical annex for further assumptions.

TABLE 5.3.4

The impact of unemployment benefits on potential migration and income
(Per cent)

	Share of unemployment benefit in post-tax wage income			
	0	20	40	60
Ratio of post-tax wages				
Manual workers	3.00	2.99	2.99	2.98
Non-manual workers	1.88	1.88	1.88	1.88
Ratio of expected income				
Manual workers	2.39	2.52	2.64	2.76
Non-manual workers	1.72	1.73	1.73	1.74
Migration scenario I ^a				
Total migration as a per cent of population	3.87	4.06	4.23	4.38
Share of manual workers	0.79	0.80	0.81	0.81
<i>Percentage increase (decrease)</i>				
Total GDP: Host country	1.87	1.96	2.03	2.11
Source country	-1.99	-2.07	-2.13	-2.21
Total region	0.79	0.82	0.86	0.89
Income of natives host country	-0.28	-0.42	-0.56	-0.70
Manual workers	-4.25	-4.39	-4.50	-4.52
Non-manual workers	0.61	0.45	0.28	0.05
Capital owners	1.87	1.96	2.03	2.11
Income of migrants	113.28	124.75	136.01	145.88
Migration scenario II ^b				
Total migration as a per cent of population	4.68	4.88	5.05	5.21
Share of manual workers	0.65	0.66	0.67	0.68
<i>Percentage increase (decrease)</i>				
Total GDP: Host country	2.41	2.50	2.58	2.65
Source country	-2.75	-2.84	-2.92	-2.98
Total region	0.96	1.00	1.03	1.06
Income of natives host country	-0.33	-0.46	-0.60	-0.75
Manual workers	-3.73	-3.92	-4.09	-4.24
Non-manual workers	-0.12	-0.33	-0.54	-0.76
Capital owners	2.41	2.50	2.58	2.65
Income of migrants	103.63	113.11	122.48	131.72

Source: Author's calculations.

Note: The simulation is, *inter alia*, based on the following assumptions: (i) the total unemployment rate is 0.1; (ii) the unemployment rate of migrants is, for a given skill, twice as high as that of natives; (iii) the unemployment rate of manual workers is 0.15, the unemployment rate of non-manual workers is 0.066; (iv) the semi-elasticity of manual wages with respect to the unemployment rate is -1.0; (v) the semi-elasticity of non-manual wages is -1.5. See text and technical annex for further assumptions.

a The semi-elasticity of the migration share with respect to expected income is 0.05.

b The semi-elasticity of migration with respect to expected income is 0.05 for manual workers, and 0.1 for non-manual workers.

TABLE 5.3.5

The impact of migration with regional wage and unemployment differences

Regional differences in wages and unemployment rates		Clearing labour markets ^a		Clearing labour markets in the high-wage region ^b		Higher wage flexibility in the high-wage region ^c	
		Heterogeneous regions	Homogenous regions	Heterogeneous regions	Homogenous regions	Heterogeneous regions	Homogenous regions
Increase (decrease) in per cent							
Total GDP	Host country	0.85	0.68	0.90	0.50	0.72	0.48
	Source country	-0.71	-0.71	-0.43	-0.43	-0.53	-0.53
	Total region	0.41	0.29	0.53	0.24	0.37	0.19
Total income of natives	Host country	0.005	0.002	0.01	-0.11	-0.11	-0.14
	Source country	-	-	0.30	0.30	0.19	0.19
	Total region	-	-	0.08	-	-0.03	-0.05
<i>of which:</i>							
Manual workers	Host country	-1.30	-1.05	-1.36	-0.87	-1.23	-0.88
	Source country	0.29	0.29	0.57	0.57	0.46	0.46
	Total region	-0.74	-0.57	-0.68	-0.35	-0.62	-0.40
Non-manual workers	Host country	0.22	0.18	0.24	-0.04	0.03	-0.08
	Source country	0.29	0.29	0.59	0.59	0.48	0.48
	Total region	0.24	0.20	0.31	0.08	0.11	0.03
Capital owners	Host country	0.85	0.68	0.90	0.50	0.72	0.48
	Source country	-0.71	-0.71	-0.43	-0.43	-0.53	-0.53
	Total region	0.41	0.29	0.53	0.24	0.37	0.19
Total income of migrants		206.84	144.07	228.41	122.45	201.89	122.30
Change of unemployment rate (percentage points)							
Total unemployment rate	Host country .....	..	..	-0.10	0.25	0.13	0.29
	Source country .....	..	..	-0.37	-0.37	-0.23	-0.23
	Total region .....	..	..	-0.23	-0.05	-0.05	0.03
Manual workers	Host country .....	..	..	-0.22	0.56	0.33	0.64
	Source country .....	..	..	-0.37	-0.37	-0.24	-0.24
	Total region .....	..	..	-0.31	-0.01	-0.02	0.10
Non-manual workers	Host country .....	..	..	-0.04	-	-0.03	0.01
	Source country .....	..	..	-0.35	-0.35	-0.21	-0.21
	Total region .....	..	..	-0.13	-0.11	-0.08	-0.06

Source: Author's calculations.

Note: In the case of heterogeneous regions, GDP and wages for manual and non-manual workers in the high-income region of the host country are 26 per cent above the country average, and in the low-income region 26 per cent below the country average. The labour force of the high-income and of the low-income regions of the host country are the same size. In the case of heterogeneous regions all migrants move into the high-wage region. For the source country and the reference case the assumptions of the baseline scenario apply.

^a Clearing labour markets in host and source country.

^b Clearing labour markets in the high-income region, elasticity of wages with respect to unemployment of 0.4 for manual workers and 0.1 for non-manual workers in the low-income region and source country, of 0.8 and 1.5 in the reference case of homogenous regions.

^c Elasticity of wages with respect to unemployment for manual workers of 1.5 and 2.5 for non-manual workers in the high-income region, of 0.6 for manual workers and of 0.8 for non-manual workers in the low-income region and source country, of 1 and 1.5 for manual and non-manual workers, respectively, in the reference case of homogenous regions.

TABLE 5.3.6

The wage impact of migration: a survey of European studies, 1992-2002

Study	Year	Country	Approach	Data base	Control for endogeneity	Impact on native wages ^a			
						All	Less skilled	Medium skilled	High skilled
DeNew and Zimmermann	1994	Germany	Wage equation	Household panel (GSOEP, 1982-1989)	Instrumental variables	-4.1	-5.3 ^b	..	1.4 ^c
DeNew and Zimmermann	1994	Germany	Wage equation	Household panel (GSOEP, 1982-1989)	Instrumental variables	..	-6.4 ^b	..	..
Haisken-DeNew and Zimmermann	1995	Germany	Wage equation	Household panel (GSOEP, 1982-1989)	Instrumental variables	0.6	0.2 ^b	..	1.3 ^c
Bauer	1997	Germany	Production function (translog)	Cross-section, IAB-employment sample (1990)	Instrumental variables	..	0.2 ^d	- ^e	0.1 ^{fg}
Gavasto, Venturini and Villosio	1999	Italy	Wage equation	Panel, Social Security Archive (SSA)	Estimation in first differences	0.1	0.1 ^b	..	0.1 ^c
Brücker, Kreyenfeld and Schräpler	2001	Germany	Wage equation	IAB-employment sample (1990-1995)	Instrumental variables	-0.6	-1.6 ^b	..	-0.1 ^c
Trabold and Trübswetter	2002	Germany	Wage equation	IAB-employment sample (1990-1995)	Estimation in first differences	0.014	0.03	0.014	0.014
Hofer and Huber	2001	Austria	Wage equation	Social security records	Instrumental variables	-0.3	-0.4 ^b	..	0.1 ^c
Hunt	1992	France	Differenced cross-sectional regression (natural experiment)	Cross-section of regions, 1962-1968	Instrumental variables	0-0.8	..	..	..
Winter-Ebmer and Zimmermann	2000	Austria, Germany	Panel regression across industries	Industry level data (Austria: 1987-1994, Germany: 1986-1994)	Instrumental variables	-0.32 ^h 0.02 ⁱ	..	..	..

Source: J. DeNew and K. Zimmermann, "Native wage impacts of foreign labor: a random effects panel analysis", *Journal of Population Economics*, Vol. 7, 1994, pp. 177-192; J. DeNew and K. Zimmermann, "Blue-collar labor vulnerability: wage impacts of migration", in G. Steinmann and R. Ulrich (eds.), *The Economic Consequences of Immigration to Germany* (Heidelberg, Physica, 1994), pp. 81-89; K. Zimmerman, *Wage and Mobility Effects of Trade and Migration*, CEPR Discussion Paper, No. 1318 (London), January 1995; T. Bauer, "Do immigrants reduce native wages? Evidence from Germany", *Münchner Wirtschaftswissenschaftliche Beiträge 97* (Munich), 1997; A. Gavasto, A. Venturini and C. Villosio, "Do immigrants compete with natives?", *Labour*, Vol. 13, 1999, pp. 603-622; H. Brücker, M. Kreyenfeld and J. Schräpler, *Trade and Migration: Impact on Wages, Employment and Labour Mobility in Western Germany*, German Institute for Economic Research (Berlin), 1999, mimeo; H. Trabold and P. Trübswetter, "Schätzung der Beschäftigungs- und Lohnwirkungen der Zuwanderung", in H. Brücker, H. Trabold, P. Trübswetter and C. Weise (eds.), *Migration: Potential und Effekte für den deutschen Arbeitsmarkt*, Final Report for the Hans-Böckler-Foundation, DIW (Berlin), 2001; H. Hofer and P. Huber, *Eastward Enlargement, Trade and Migration: Impact on the Austrian Labor Market*, Institute of Advanced Studies (Vienna), 1999, mimeo; J. Hunt, "The impact of the 1962 repatriates from Algeria on the French labor market", *Industrial and Labor Relations Review*, Vol. 45, 1992, pp. 556-572; R. Winter-Ebmer and K. Zimmermann, "East-west trade and migration: the Austro-German case", in R. Faini, J. De Melo and K. Zimmermann (eds.), *Migration. The Controversies and the Evidence* (Cambridge, Cambridge University Press, 1999), pp. 296-328.

^a Change in wages associated with an increase in the share of foreigners in the total labour force by 1 percentage point. Point elasticities from some studies are converted at the sample mean by the author.

^b Blue-collar workers.

^c White-collar workers.

^d Unskilled workers.

^e Skilled, blue-collar workers.

^f High-skilled, white-collar workers.

^g Derived from the cross-elasticities for several foreigner groups weighted by their present shares in foreign employment.

^h Austria.

ⁱ Germany.

TABLE 5.3.7

The employment impact of migration: a survey of European studies, 1992-2002

Study	Year	Country	Approach	Database	Control for endogeneity	Impact on employment
Gang and Rivera-Batiz	1996	EU-12	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (Eurobarometer 1988)	None	Positive, but insignificant correlation between unemployment probability and foreigner density
Gang and Rivera-Batiz	1999	EU-12	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (Eurobarometer 1988)	None	Weak, but significant positive correlation between unemployment probability and foreigner density
Hunt	1992	France	Differenced cross-sectional regression (natural experiment)	Cross-section of regions, 1962-1968	Instrumental variables	An increase of the foreigner share by 1 percentage point increases native unemployment rate by 0.2 percentage points
Mühleisen and Zimmermann	1994	Germany	Estimation of individual (un-)employment probability (Probit)	Household panel (GSOEP, 1982-1989)	None	No significant impact of foreigner share on unemployment probability
Villosio and Venturini	2002	Italy	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (labour force survey, 1993-1997)	No, tests reject endogeneity	Ambiguous signs for both, displacement risks and entry probability
Winkelmann and Zimmermann	1993	Germany	Estimation of individual (un-)employment probability (Poisson-distribution)	Household panel (GSOEP, 1974-1984)	None	No significant increase of unemployment frequency of natives
Winter-Ebmer and Zweimüller	1994	Austria	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (social security records 1988-1989, 1991-1992)	Instrumental variables	An increase of the foreigner share by 1 percentage point increases individual displacement risks by -1 to 1.1 per cent (instrumented), 0.1 to 0.4 per cent (not instrumented)
Hofer and Huber	1999	Austria	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (social security records 1991-1994)	Instrumental variables	An increase in the foreigner share by 1 percentage point increases individual displacement risks by 0.8 per cent
Brücker, Schräpler and Kreyenfeld	1999	Germany	Estimation of individual (un-)employment probability (Probit)	Cross-section of individuals (IAB-employment sample, 1990-1995)	Instrumental variables	An increase in the foreigner share by 1 percentage point increases individual displacement risks by 0.2 per cent
Pischke and Velling	1997	Germany	Estimation of different panel models	Regional data (labour market areas and counties), 1985-1989	Instrumental variables	Weak correlation between foreigner share and unemployment rate with ambiguous signs
Winter-Ebmer and Zimmermann	2000	Austria, Germany	Panel regression across industries	Industry level data 1987-1994 (Austria), 1986-1994 (Germany)	Instrumental variables	An increase in the foreigner share by 1 percentage point increases (decreases) total employment by -0.002 per cent (Austria) and 0.025 per cent (Germany), and native employment by -0.25 per cent (Austria) and -0.04 per cent (Germany)

Source: I. Gang and F. Rivera-Batiz, "Unemployment and attitudes towards foreigners in Germany", in G. Steinmann and R. Ulrich (eds.), *The Economic Consequences of Immigration to Germany* (Heidelberg, Physica, 1994), pp. 121-154; idem, *Immigrants and Unemployment in Europe*, IZA Discussion Paper, No. 70 (Bonn), 1999; J. Hunt, "The impact of the 1962 repatriates from Algeria on the French labor market", *Industrial and Labor Relations Review*, Vol. 45, 1992, pp. 556-572; M. Mühleisen and K. Zimmermann, "A panel analysis of job changes and unemployment", *European Economic Review*, Vol. 38, 1994, pp. 793-801; C. Villosio and A. Venturini, *Are Immigrants Competing with Natives in the Italian Labour Market? The Employment Effect*, University of Turin, 2002, mimeo; R. Winkelmann and K. Zimmermann, "Ageing, migration and labour mobility", in P. Johnson and K. Zimmermann (eds.), *Labour Markets in an Ageing Europe* (Cambridge, Cambridge University Press, 1993), pp. 255-283; R. Winter-Ebmer and J. Zweimüller, *Do Immigrants Displace Native Workers? The Austrian Experience*, CEPR Discussion Paper, No. 991 (London), July 1994; H. Hofer and P. Huber, *Eastward Enlargement, Trade and Migration: Impact on the Austrian Labour Market*, Institute of Advanced Studies (Vienna), 1999, mimeo; H. Brücker, M. Kreyenfeld and J. Schräpler, *Trade and Migration: Impact on Wages, Employment and Labour Mobility in Western Germany*, German Institute for Economic Research (Berlin), 1999, mimeo; J. Pischke and J. Velling, "Employment effects of immigration to Germany: an analysis based on local labor markets", *Review of Economics and Statistics*, Vol. 79, 1997, pp. 594-604; R. Winter-Ebmer and K. Zimmermann, "East-west trade and migration: the Austro-German case", in R. Faini, J. De Melo and K. Zimmermann (eds.), *Migration. The Controversies and the Evidence* (Cambridge, Cambridge University Press, 1999), pp. 296-328.

Note: Elasticities have been converted at the sample mean by the author.

TECHNICAL ANNEX

OUTLINE OF THE SIMULATION MODEL

The simulations of the impact of migration on output, wages and income distribution in the host and source countries in section 5.3 are based on a highly stylized model of two economies, which produce one good and apart from migration are closed. This annex describes the basic features of the model. Many aspects of it are drawn from Levine²⁰⁸ but, in contrast to the Levine model, the labour market here is split between unskilled and high skilled segments with different elasticities of wages with respect to the unemployment rate.²⁰⁹ The model naturally relies on a number of arbitrary assumptions, but it nevertheless helps to analyse some of the mechanisms through which migration may affect the incomes and employment of the affected parties in both the host and source countries.

Outline of the basic model

The output of the host and the source countries' economies is produced with unskilled labour, skilled labour and physical capital. The production technology has constant returns to scale and is approximated by a Cobb-Douglas function, such that:

$$Y_i = \bar{A}_i L_i^{\alpha_i} H_i^{\beta_i} \bar{K}_i^{1-\alpha_i-\beta_i}, \quad i = f, h \quad (\text{A1})$$

where Y_i denotes output, \bar{A}_i is a productivity parameter, which reflects the level of technology and institutions; L_i and H_i are unskilled and skilled labour, respectively; and \bar{K}_i is physical capital. α_i , β_i , and $1-\alpha_i-\beta_i$ are the shares of unskilled labour, skilled labour and capital, respectively, in total income, and $i \in \{f, h\}$ is an index for the country of destination, f , and the country of origin, h , respectively. Let \bar{N}_i be the initial pre-migration endowment of unskilled labour in country i , and let \bar{S}_i be its initial endowment of skilled labour. Thus the post-migration allocation of unskilled labour in the country of destination and the source country is given by:

$$N_f = \bar{N}_f + \gamma M, \quad N_h = \bar{N}_h - \gamma M \quad (\text{A2})$$

where M denotes the number of migrants, and γ the proportion of unskilled labour in the migrant population. Analogously, the post-migration allocation of skilled labour can be written as:

$$S_f = \bar{S}_f + (1-\gamma) M, \quad S_h = \bar{S}_h - (1-\gamma) M \quad (\text{A3})$$

where $1-\gamma$ denotes the proportion of skilled workers in the migrant population. In all the simulations, it is assumed that the total labour force, i.e. the number of skilled and unskilled workers, in the host and the home country is equal in the pre-migration state. The model is "short-run" in the sense that the productivity parameter and physical capital endowments are assumed to be fixed.

Wages and the demand for labour are determined sequentially. In the first stage, wages are fixed by a bilateral bargaining monopoly between trade unions and employer federations.²¹⁰ In the second stage, profit-maximizing firms hire labour until the marginal product of labour equals the wage rate; the participants in the wage negotiations are aware

²⁰⁸ P. Levine, op. cit.

²⁰⁹ T. Bauer and K. Zimmermann, op. cit., for a similar assumption.

²¹⁰ The argument elaborated here is consistent with different models of wage setting, i.e. models with a monopoly union or a bilateral bargaining monopoly (e.g. R. Layard, S. Nickell and R. Jackson, op. cit.), efficiency wage theories (e.g. S. Salop, "A model of the natural rate of unemployment", *American Economic Review*, Vol. 74, 1979, pp. 117-125) or shirking models (C. Shapiro and J. Stiglitz, "Equilibrium unemployment as a worker discipline device", *American Economic Review*, Vol. 74, 1984, pp. 433-444). See also P. Levine, op. cit. The analysis, however, only considers the long-run response of wages to a change in labour supply, i.e. the impact of short-run fluctuations in (un-) employment rates is ignored.

of this. Given this wage-setting mechanism, wages respond – albeit imperfectly – to the unemployment rate in the economy. This allows wage rates to be expressed as functions of the unemployment rate, i.e. as:

$$w_{L,i} = f_i(u_{L,i}), \quad f_i'(u_{L,i}) < 0 \quad (\text{A4})$$

and

$$w_{H,i} = g_i(u_{H,i}), \quad g_i'(u_{H,i}) < 0 \quad (\text{A5})$$

where the unemployment rates for unskilled and skilled labour are defined as $u_{L,i} = 1 - L_i/N_i$ and $u_{H,i} = 1 - H_i/S_i$, respectively. Thus, the elasticity of wages with respect to the unemployment rate is allowed to differ for unskilled and skilled labour.

The impact of migration on employment is then determined by the marginal product of skilled and unskilled labour and the flexibility of wages in the respective labour markets, i.e. by:

$$\alpha_i \bar{A}_i L_i^{-(1-\alpha_i)} H_i^{\beta_i} \bar{K}_i^{1-\alpha_i-\beta_i} = f_i \left(1 - \frac{L_i}{N_i} \right) \quad (\text{A6})$$

and

$$\beta_i \bar{A}_i L_i^{\alpha_i} H_i^{-(1-\beta_i)} \bar{K}_i^{1-\alpha_i-\beta_i} = g_i \left(1 - \frac{H_i}{S_i} \right) \quad (\text{A7})$$

where the definitions for the unemployment rate are used on the right-hand side.

Equations (A1) to (A7) determine output, the size of the labour force, the wage rates, and the employment of unskilled and skilled workers in both economies. The semi-elasticity of the wage of unskilled labour with respect to unemployment can be written as $\eta_i = -f_i'(u_{L,i})/w_{L,i}$, and, analogously, that for skilled labour as $\mu_i = -g_i'(u_{H,i})/w_{H,i}$. Differentiating (A6) implicitly with respect to M then yields, after algebraic manipulation the marginal response of employment of unskilled labour, L_i , to migration:

$$\frac{dL_f}{dM} = \frac{\gamma \eta_f [(1-\beta_f)S_f + \mu_f H_f] L_f^2 / N_f + (1-\gamma) \mu_f \beta_f L_f H_f N_f / S_f}{[(1-\alpha_f)N_f + \eta_f L_f] [(1-\beta_f)S_f + \mu_f H_f] - \alpha_f \beta_f N_f S_f} \quad (\text{A8})$$

and

$$\frac{dL_h}{dM} = -\frac{\gamma \eta_h [(1-\beta_h)S_h + \mu_h H_h] L_h^2 / N_h + (1-\gamma) \mu_h \beta_h L_h H_h N_h / S_h}{[(1-\alpha_h)N_h + \eta_h L_h] [(1-\beta_h)S_h + \mu_h H_h] - \alpha_h \beta_h N_h S_h} \quad (\text{A9})$$

where N_i and S_i are determined by equations (A2) and (A3). Differentiating (A7) implicitly with respect to migration analogously gives the marginal response of employment of skilled labour, H_i , to migration:

$$\frac{dH_f}{dM} = \frac{(1-\gamma) \mu_f [(1-\alpha_f)N_f + \eta_f L_f] H_f^2 / S_f + \gamma \alpha_f \eta_f L_f H_f S_f / N_f}{[(1-\alpha_f)N_f + \eta_f L_f] [(1-\beta_f)S_f + \mu_f H_f] - \alpha_f \beta_f N_f S_f} \quad (\text{A10})$$

and

$$\frac{dH_h}{dM} = -\frac{(1-\gamma) \mu_h [(1-\alpha_h)N_h + \eta_h L_h] H_h^2 / S_h + \gamma \alpha_h \eta_h L_h H_h S_h / N_h}{[(1-\alpha_h)N_h + \eta_h L_h] [(1-\beta_h)S_h + \mu_h H_h] - \alpha_h \beta_h N_h S_h} \quad (\text{A11})$$

Thus, the greater the flexibility of labour markets, i.e. the larger the semi-elasticity between the wage and the unemployment rate, the greater is the marginal response of employment with respect to migration

Consider two extreme cases: in the first, the labour markets are completely flexible, i.e. $\eta_i \rightarrow \infty$, $\mu_i \rightarrow \infty$ and $L_i \rightarrow N_i$, $H_i \rightarrow S_i$. In this case, equations (A8) and (A10) converge to γ and $(1-\gamma)$, respectively, and equations (A9) and (A11) to $-\gamma$ and $-(1-\gamma)$, respectively. The labour force in the host country then increases exactly by the number of immigrant workers, and the labour force in the home country is reduced exactly by the number of migrant workers.

This case corresponds to the textbook example of the impact of migration in an economy with labour market clearing and an inelastic supply of native labour.²¹¹ This is our reference case as calibrated in table 5.3.1 in section 5.3.

At the other extreme, the wages for unskilled labour are perfectly inflexible, i.e. $\eta_i \rightarrow 0$, while those for skilled labour are perfectly flexible, i.e. $\mu_i \rightarrow 0$. In this case, immigration of unskilled workers does not change the level of employment for unskilled workers, but simply increases the level of unemployment for unskilled workers in the host countries. However, the immigration of skilled workers increases the level of employment for unskilled workers in the host countries, since skilled and unskilled workers are complements by assumption. Thus, the impact of migration on (un-)employment and income depends essentially on the composition of the migrant population with respect to their skill levels. This case as well as examples with different degrees of wage flexibility are calibrated in table 5.3.2 of section 5.3.

The allocation of jobs among natives and migrants

For an analysis of the impact of migration on the incomes of natives and migrants, it is necessary to make additional assumptions about the employment opportunities of natives and migrants. Following the traditional approach of Todaro²¹² and Harris and Todaro,²¹³ it is assumed that in each period all jobs are randomly allocated among the total labour force, i.e. among natives and migrants. However, the selection process is modified to allow for the possibility that the employment opportunities of migrants are less than those of natives, i.e.

$$p_{ML,f} = \lambda (1 - u_{L,f}), \quad p_{NL,f} = (1 + (1 - \lambda)\gamma M/N_f)(1 - u_{L,f}) \quad (\text{A12})$$

and

$$p_{HL,f} = \lambda (1 - u_{L,f}), \quad p_{NH,f} = (1 + (1 - \lambda)(1 - \gamma)M/N_f)(1 - u_{H,f}) \quad (\text{A13})$$

where p_{Mj} and p_{Nj} denote the probability of employment for migrants and natives in the host country, respectively ($j = L, H$), and the factor λ ($0 < \lambda \leq 1$) accounts for the possibility that the employment opportunities of migrants are inferior to those of natives. Note that this implies that some of the employment risks of natives are shifted to migrants. For natives in the home country we assume that the employment probabilities are simply given by:

$$p_{L,h} = 1 - u_{L,h}, \quad p_{H,h} = 1 - u_{H,h} \quad (\text{A14})$$

The role of unemployment benefits

Migration does not only affect income through wages and employment, but also through welfare benefits. In order to consider its impact on welfare benefits, it is assumed that unemployment benefits are a fixed proportion of post-tax wages, i.e. $b_i(1 - t_i)w_{ij}$, where t_i denotes a uniform income tax rate, $i = f, h$, the respective country, and $j = L, H$, skilled and unskilled labour, respectively. Physical capital is not taxed. If it is assumed that the budget is balanced and if all other public expenditure is ignored, then taxes must be equal to the unemployment costs, which gives the tax rate:

$$t_i = b_i \frac{w_{Li} u_{Li} N_i + w_{Hi} u_{Hi} S_i}{(1 - (1 - b_i)u_{Li})w_{Li} N_i + (1 - (1 - b_i)u_{Hi})w_{Hi} S_i} \quad (\text{A15})$$

where N_i and S_i are the post-migration endowments of unskilled and skilled labour as determined in equations (2) and (3). The impacts of varying levels of unemployment benefit and, hence, different tax rates, on the income of natives and migrants are calibrated in table 5.3.3 in section 5.3.

²¹¹ K. Wong, *International Trade in Goods and Factor Mobility* (Cambridge, MA, MIT Press, 1995), pp. 628-632.

²¹² M. Todaro, "A model of labor migration and urban employment in less developed countries", *American Economic Review*, Vol. 59, 1969, pp. 138-148.

²¹³ J. Harris and M. Todaro, op. cit.

Endogenous migration

So far it is assumed that the migration rate is given. For an analysis of the impact of migration policies on welfare, however, it is also necessary to consider the determinants of the migration rate. The analysis here is limited to the simple case of permanent migration.²¹⁴

Assume that migrants do not own any physical capital; the net present value of expected income in the foreign country for an infinitively lived household is then given by:

$$V_{jft} = \sum_{\tau=0}^{\infty} \delta^{\tau} [p_{jft+\tau} + b_f(1 - p_{jft})] \tilde{w}_{jft}, \quad j = L, H \quad (\text{A16})$$

and in the home country by:

$$V_{hjt} = \sum_{\tau=0}^{\infty} \delta^{\tau} [p_{hjt+\tau} + b_h(1 - p_{hjt})] \tilde{w}_{hjt}, \quad j = L, H \quad (\text{A17})$$

where $\delta < 1$ denotes the discount factor, and $\tilde{w}_{ijt} = (1 - t_i)w_{ijt}$ the post-tax wage; the employment probabilities are given by (A13) and (A14).

For convenience, it is assumed that manual workers expect that following generations will remain manual workers, while the converse holds for non-manual workers. A risk-neutral individual will migrate if the difference in the net present value of living in a foreign country and at home exceeds the net present value of all the pecuniary and non-pecuniary costs of migration, i.e. if:

$$V_{jft} - V_{hjt} \geq \sum_{\tau=0}^{\infty} \delta^{\tau} C_{j,t+\tau} \quad (\text{A18})$$

If the migration costs are written on the left hand side of (A18) as a fraction of the net present value of living at home, i.e. as cV_{hjt} , then the factor $1/(1-\delta)$ cancels out and the following is obtained:

$$\frac{p_{jft} + b_f(1 - p_{jft}) \tilde{w}_{jft}}{p_h + b_h(1 - p_h) \tilde{w}_{jh}} \geq 1 + c_j \quad (\text{A19})$$

i.e. the ratio of expected real income in the foreign and the home country has to exceed the cost factor $1 + c_j$. Note that there are no transitional dynamics in the system and all variables jump immediately to steady state values so that the time subscript can be dropped.²¹⁵

Following Faini and Venturini,²¹⁶ Ludema and Wooton²¹⁷ and Brücker,²¹⁸ it is assumed that individuals differ with respect to their preferences and their costs of migration. In the steady state, the net present value of expected income just equals the net costs of migration for the marginal migrant. Thus, it is assumed that a macroeconomic function exists which determines the share of migrants in the home population as a function of the expected difference in per capita income in the steady state. Depending on the assumptions about the distribution of the costs of migration and of preferences across the population, different functional forms can be conceived. For the simulations here, it is assumed that the share of migrants in the labour force of the home population is a semi-logarithmic function of the ratio of expected income. This functional form is used in several macro studies on the determinants of migration.²¹⁹ Thus, the steady state share of migrants in the

²¹⁴ See P. Levine, op. cit., for a similar approach.

²¹⁵ P. Levine, op. cit.

²¹⁶ R. Faini and A. Venturini, *Migration and Growth: The Experience of Southern Europe*, CEPR Discussion Paper, No. 964 (London), May 1994.

²¹⁷ R. Ludema and I. Wooton, "Regional integration, trade and migration: are demand linkages relevant in Europe?", in R. Faini, J. De Melo and K. Zimmermann, op. cit., pp. 51-68.

²¹⁸ H. Brücker, "Die Folgen der Freizügigkeit ...", op. cit.

²¹⁹ T. Hatton, "A model of UK emigration, 1870-1913", *Review of Economics and Statistics*, Vol. 77, 1995, pp. 407-415; T. Boeri, H. Brücker et al., op. cit., H. Brücker, op. cit.

labour force of unskilled workers in the source country is given by the probability that the ratio of expected income in the host to the home country equals the costs of migration for the k th individual, i.e. by:

$$\frac{\gamma M}{N_h} = \Pr\left(\frac{V_{L,f}}{V_{L,h}} \geq 1 + c_{L,k}\right) = \theta \ln\left(\frac{V_{L,f}}{V_{L,h}}\right) \quad (\text{A20})$$

and the steady state share of migrants in the labour force of skilled workers is given analogously by:

$$\frac{(1-\gamma)M}{S_h} = \Pr\left(\frac{V_{H,f}}{V_{H,h}} \geq 1 + c_{H,n}\right) = \sigma \ln\left(\frac{V_{H,f}}{V_{H,h}}\right) \quad (\text{A21})$$

i.e. the propensity to migrate for skilled and unskilled workers is allowed to differ.

Based on these assumptions, we calibrated the impact of the income differential and different rates of unemployment benefit on the overall migration potential and the shares of unskilled and skilled workers in the migrant population was calibrated as in table 5.3.5 in section 5.3.

TECHNICAL ANNEX TABLE

The impact of the skill level of migrants in an environment with unemployment

Semi-elasticity of manual wages		-1.0	-1.0	-1.0	-1.0	-1.0
Semi-elasticity of non-manual wages		-∞	-∞	-∞	-∞	-∞
Share of manual workers in migrant population		1.0	0.7	0.5	0.3	0.0
Percentage change at an immigration (emigration) of 1 per cent of the labour force						
Total GDP	Host country	0.37	0.52	0.61	0.71	0.85
	Source country	-0.35	-0.63	-0.83	-1.02	-1.32
	Total region	0.17	0.19	0.21	0.22	0.24
Total income of natives	Host country	-0.24	-0.12	-0.04	0.05	0.18
	Source country	0.24	0.08	-0.03	-0.14	-0.32
	Total region	-0.11	-0.06	-0.03	-	0.05
<i>of which:</i>						
Manual workers	Host country	-1.66	-0.95	-0.47	0.02	0.76
	Source country	1.02	0.34	-0.11	-0.55	-1.22
	Total region	-0.72	-0.49	-0.34	-0.19	0.03
Non-manual workers	Host country	0.23	-0.01	-0.17	-0.33	-0.56
	Source country	-0.24	0.40	0.84	1.28	1.96
	Total region	0.13	0.07	0.03	-0.02	-0.09
Capital owners	Host country	0.37	0.52	0.61	0.71	0.85
	Source country	-0.35	-0.63	-0.83	-1.02	-1.32
	Total region	0.17	0.19	0.21	0.22	0.24
Total income of migrants		171.46	127.87	106.22	88.35	66.40
Nominal wage rate						
Manual workers	Host country	-0.99	-0.58	-0.30	-0.02	0.40
	Source country	0.52	0.18	-0.05	-0.29	-0.63
	Total region	0.16	0.21	0.24	0.28	0.33
Non-manual workers	Host country	0.37	0.02	-0.22	-0.45	-0.80
	Source country	-0.34	0.37	0.85	1.34	2.08
	Total region	0.21	0.27	0.30	0.33	0.38
Post-tax wage rate						
Manual workers	Host country	-1.12	-0.65	-0.34	-0.02	0.46
	Source country	0.62	0.21	-0.07	-0.34	-0.76
	Total region	0.11	0.17	0.21	0.26	0.32
Non-manual workers	Host country	0.23	-0.06	-0.26	-0.46	-0.75
	Source country	-0.24	0.40	0.84	1.28	1.96
	Total region	0.11	0.17	0.21	0.26	0.32
Change of unemployment rate in percentage points						
Total unemployment rate	Host country	0.40	0.23	0.12	0.01	-0.16
	Source country	-0.36	-0.12	0.04	0.20	0.44
	Total region	0.02	0.06	0.08	0.10	0.14
Manual workers	Host country	0.99	0.58	0.30	0.02	-0.40
	Source country	-	0.00	-	-	-
	Total region	0.04	0.10	0.14	0.19	0.25

Source: Author's calculations.

Note: See text and technical annex for the assumptions of the simulation model.

DISCUSSANTS' COMMENTS

5.A Stanislaw Golinowska

and

5.B Georg Fischer

TABLE 5.A.1

Top three nationalities among foreign workers in the CEE countries, 1998
(Per cent)

Hungary		Poland		Slovakia ^a		Czech Republic ^b		Bulgaria	
Romania	47.2	Ukraine	14.2	Czech Republic	36.3	Slovakia	55.1	United States	23.3
CIS	12.6	Belarus	13.3	Poland	12.2	Ukraine	17.3	Ukraine	10.2
China	4.7	Viet Nam	8.6	Ukraine	11.3	Poland	8.9	United Kingdom	7.1
								The former Yugoslav Republic of Macedonia	7.1

Source: OECD legal survey in M. Lubyova, "Status of foreign residents and foreign workers in selected central and east European countries", paper presented at the OECD Seminar on *Recent Developments in Migration and the Labour Market in Central and Eastern Europe in the Context of the EU Enlargement* (Bratislava), 2-3 March 2000; OECD SOPEMI, *Trends in International Migration*, Annual Report (Paris), 1999.

Note: Work permit holders at the end of 1998. Figures indicate percentage share of total foreign workers. For Bulgaria, the figures refer to work permits granted during September 1994-October 1999. For the Czech Republic and Slovakia, including nationals of the other country (exempted from work permit requirement).

^a Excluding Czech workers, the three largest nationalities are: Poland (19.2), Ukraine (17.8) and the United States (7.5).

^b Excluding Slovak workers, the three largest nationalities are: Ukraine (38.6), Poland (19.9) and Bulgaria (5.4).