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A macroeconometric disequilibrium analysis of current and future migration from Eastern Europe into West Germany

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Abstract

This paper attempts to evaluate the impact of current and future immigration flows on major macroeconomic variables of the West German economy. The analysis is based on a macroeconometric disequilibrium model for the West German economy. This model is extended until 1995 and used for several simulation experiments. Special attention is given to the notion that the effects of immigration are regime-specific, i.e., they depend on the type of disequilibrium prevailing on the goods and labor market.

1 Introduction

In recent years East-West migration has taken center stage in the academic and public discussion on international migration. There are several reasons to expect migration pressure from East European countries including the former USSR. Not only are people in these states aware of huge income differentials to Western industrialized countries, but also there is hardly any reason to expect that the transition process to a market economy will soon lead to a considerable increase in prosperity there, which would reduce the wish for migration. Moreover, additional migration pressure might stem from huge and partly unknown environmental damages in those countries as well as from civil wars in states of the former Soviet Union and Yugoslavia.

In addition, there is evidence of a growing inflow of German ethnics mostly from the former Soviet Union. Until the end of this decade, forecasts of these inflows range from 2.2 to 2.7 million people living in the former USSR, who will emigrate to Germany. Taken at face value, about 300,000 people will move to Germany per year on average.

On the other hand, Germany is a country with a rich historical experience with immigration flows on a larger scale. For example, the number of foreign workers in Germany increased from nearly 300,000 people in 1960 to a peak of 2.5 million in 1973, i.e., from 1.3 percent to 10 percent of all employees. Despite a decline of these guestworkers to 1.7 million persons in 1989 (i.e., before unification), the foreign population in West Germany amounted to 4.9 million persons, i.e., 7.8 percent of the whole West German population, compared with 1.2 percent in 1960. As of 1992 6.5 million foreigners live in West Germany, i.e., 10 percent of the West German population. While these proportions do not seem extraordinarily high in an international perspective, it is their rapid increase in the last few years which constitutes the focus of public concern.

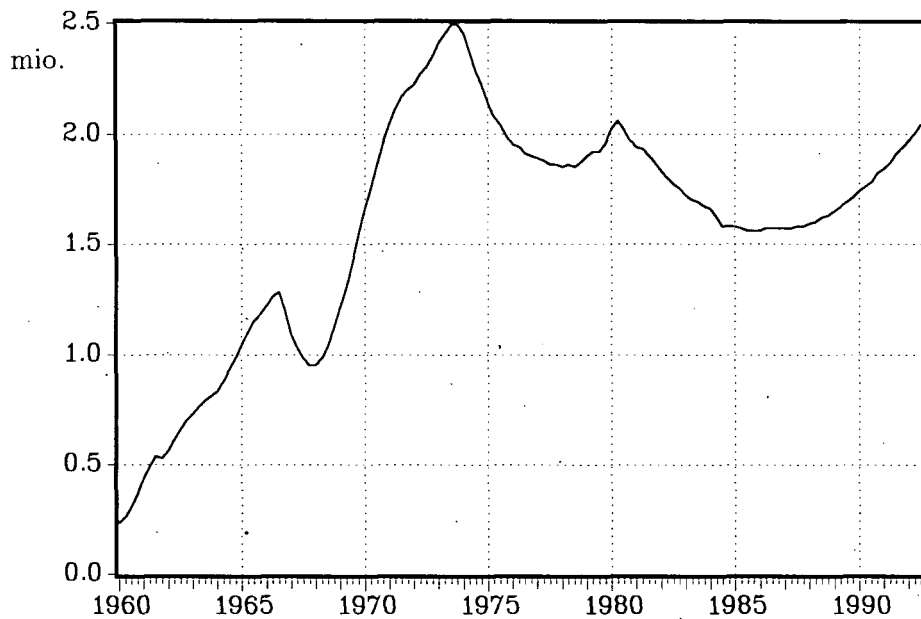
More specifically, the controversial debate is on how migration affects major macroeconomic variables such as employment and growth and, consequently, what is their impact on, say, social security systems and the housing market. This paper takes up the first issue. In light of the recent research efforts on macroeconomic disequilibrium models our study attempts to marshal the macroeconomic effects of current and expected future immigration from Eastern Europe into West Germany. In this context special attention is given to the essence of these disequilibrium models by focussing on which "regime" is prevailing on the goods and labor market.

The paper is organized as follows. The next section is devoted to a quantitatively oriented, very brief stocktaking of past, current, and expected migration flows into West Germany. Section 3 briefly introduces the basic theoretical framework of the disequilibrium model and displays its ex-post and ex-ante forecasts of some important macroeconomic variables. Section 4 contains the assumptions concerning migration flows and the results of various simulation experiments. Section 5 concludes with policy implications, a summary and our caveats.

2 Migration into West Germany

To begin with previous migration, figure 1 concentrates on the labor market by displaying the number of foreign workers in West Germany. With the exception of the mild recession in 1967, the sixties are characterized by a steady increase of this number which was stopped in 1974, however. While a foreign worker coming from an EC member country benefits from free movement of labor within the EC, the immigration

Figure 1: Number of Foreign Workers in Germany^{a)}



a) Workers covered by social security.

Source: Amtliche Nachrichten der Bundesanstalt für Arbeit, various issues.

of non-EC-foreigners is to a much greater extent under governmental control. In situations with an excess demand for workers – as in the sixties and the early seventies – the German economy had virtually no difficulties in mitigating this gap by access to foreign labor markets due to a high willingness among foreigners to migrate to Germany. The deeper recession starting in 1973, enforced by the first oil price shock, led the German government to enact an immigration stoppage for non-EC workers. This stoppage was not a perfect one, however. Immigration was still allowed on humanitarian grounds such as family unification. Moreover, as time passed the offsprings of guestworkers born in Germany entered the German labor market.¹

While the numbers of inflows from the former German Democratic Republic (GDR) and Eastern Europe were of negligible quantities, this situation had changed dramatically by the end of the eighties. The same observation holds for asylum seekers. In order to provide an impression of various groups of immigrants of this kind and to put the simulation experiment carried out in section 4 into perspective, a brief description seems necessary.

Four groups of migrants from Central and Eastern Europe have to be distinguished:

- (i) *Germans emigrating from the former German Democratic Republic (GDR) and East-Berlin to the Federal Republic of Germany (these people are called “Übersied-*

¹For a more detailed description and econometric analysis of foreign labor supply in Germany see e.g. Franz (1981, 1991), Franz and Smolny (1990) and Smolny (1992).

Table 1: Gross Inflows of German Emigrants from the GDR and Eastern Europe^{a)}

Country of origin	1985/88 ^{b)}	1989	1990	1991	1992
GDR ^{c)}	20	344	238	—	—
East Germany ^{d)}	—	—	157 ^{e)}	246 ^{e)}	180 ^{e)}
Eastern Europe	91	377	397	222	231
– Poland	60	250	113	40	18
– USSR	16	98	148	147	195
– Romania	14	23	107	32	16
Total ^{f)}	111	721	792	468	411

Notes:

- a) See text for explanations; inflows into West Germany cumulated sums per year, 1000 persons.
- b) yearly averages.
- c) figures refer to “Übersiedler”; per definitionem “Übersiedler” are registered as such only prior to 30.06.1990.
- d) after unification.
- e) includes a minor fraction of foreigners changing residence from East Germany to West Germany.
- f) sum of first three rows.

Sources: Statistisches Jahrbuch 1992, pp. 87 and 91; Zahlen zur wirtschaftlichen Entwicklung der Bundesrepublik Deutschland 1992, table 13; Blaschke et al. (1992); Bundesverwaltungsamt: Jahresstatistik Aussiedler 1992; information given by IAB; calculations by the authors.

ler”). After German unification these persons are statistically subsummed under “internal migration” within Germany. These “Übersiedler” were immediately given the same rights as the West Germans. Table 1 reveals the sharp increase of “Übersiedler” and – later – of persons migrating from East to West Germany.

- (ii) *German citizens or people of German national identity who are repatriated from their emigration areas in Eastern Europe (these people are christened “Aussiedler”).* Table 1 displays figures of these peoples, too. As can be seen there is a jump from 91 thousand people per year during 1985 and 1988 to 377 thousand in 1989 with a decline to 231 thousand in 1992. These “Aussiedler” were normally recognized as Germans, the “rejection rate” is less than 10 percent.² Therefore, they had virtually unlimited access to the German labor market and to social benefits including special “integration benefits”.
- (iii) *Migration of non-Germans from Eastern Europe into Germany.* Table 2 provides figures for net inflows of Germans and foreigners from Eastern Europe to West Germany. In 1989 and 1990 some 150,000 foreigners belonged to this group. A comparison of the figures for Germans in table 2 with the respective figures in table 1 has to take into account two differences. First, table 2 displays net inflows rather than gross inflows. Second, in table 2 the attribute “German” refers not only to German emigrants but also to other Germans leaving the country under consideration. Therefore, the figures in table 1 are higher in most cases.

²Source: Hönckopp (1991), p. 117.

Table 2: Net Inflows into Germany from Eastern Europe (cumulated sums per year; 1000 persons)^{a)}

Country of origin	1980/84 ^{c)}		1985/88 ^{c)}		1989		1990	
	G	F	G	F	G	F	G	F
Poland	24	16	45	48	191	118	95	43
Romania	12	3	11	5	15	11	96	62
USSR	3	1	13	2	88	22	155	26
Eastern Europe ^{b)}	40	26	70	63	297	163	348	146

a) G = German nationals, F = foreigners; b) includes also Bulgaria, Czechoslovakia, Hungary; c) yearly averages.

Sources: Hönekopp (1991), pp. 127-128; Statistisches Jahrbuch 1992, p. 90; calculations by the authors.

Table 3: Inflow of asylum – seekers (cumulated sums; 1000 persons)

Citizenship	1985/88 ^{a)}	1989	1990	1991 ^{b)}	1992 ^{b)}	1993 ^{b) c)}
Europe	38	73	102	167	310	
– Yugoslavia	7	19	22	75	115	42
– Romania	2	3	35	41	103	64
– Turkey	10	20	22	24	28	11
Africa	7	13	24	36	67	
Asia	36	33	61	51	56	
Total	84	121	193	256	438	224

a) Yearly averages; b) unified Germany; c) first six months.

Source: Statistisches Jahrbuch 1992, pp. 72; Bundesamt für die Anerkennung ausländischer Flüchtlinge; calculations by the authors.

Until recently, foreigners from Eastern Europe were regarded as refugees for political reasons. This means that they were not sent back to their native countries and were allowed to have immediate access to the German labor market.

- (iv) *Asylum – seekers.* Table 3 reveals that in 1991 167,000 asylum – seekers from Europe were registered (among a total of 256,000) and that the three countries named there contribute the overwhelming proportion. For 1992, a total of 438,000 asylum – seekers is reported. Although only a minor fraction of asylum – seekers are recognized as a political refugees (asylum – seekers for economic reasons are not recognized as refugees) the overwhelming number of non-recognized asylum – seekers are not (immediately) sent back to their home countries, either on humanitarian grounds (Geneva convention) or because they appeal this decision.

In summing up, West Germany has experienced a tremendous inflow of persons both from Eastern Europe and the former *GDR* in the last years. For example, in 1989 and 1990 net inflows from Eastern Europe amounted to nearly one million people (table 2). In the same year 500,000 people changed residence from East Germany to West Germany (net of those who moved in the other direction). Adding the inflow of about

300,000 asylum – seekers during 1989 and 1990 gives a figure of nearly 1.8 million people, i.e. nearly 3 percent of the West German population.

It is important to recognize the differences between the inflow of guestworkers and the immigration from Central and Eastern Europe. Guestworker migration up to 1973 was almost entirely demand driven. Given the high willingness of foreign labor to move to Germany due to high (expected) income differentials, this type of foreign labor supply can be explained by the recruitment behaviour of German firms, i.e., German labor demand, taking into account legal barriers such as the immigration stoppage for non-EC workers. On the other hand, immigration of German ethnics and asylum-seekers is to be treated in a political-economic environment. First, only after the breakdown of the iron curtain the emigration of German ethnics was allowed by East Europe's governmental authorities on a larger scale. The request of these people to emigrate from Eastern Europe does not only stem from the adverse economic conditions in these countries but also from the desire to live with people of national identity. Moreover, there is virtually no possibility for the German government to refuse immigration of German ethnics following the articles of the German constitution. In addition, for 40 years there has existed a promise of West Germany's government to undertake every effort to repatriate these people. The only thing Germany can do is to attempt to smoothen the inflow of German ethnics. Similar arguments hold, secondly, for asylum seekers. As far as they constitute refugees for reasons such as political persecution, the German constitution unambiguously gives them the right to a (transitory) stay in Germany thus meeting the requirements of the Geneva convention. Asylum seekers for economic reasons are, however, under governmental control; by and large those people are at present not recognized as asylum seekers. Taken together the inflow after 1988 is mainly policy induced rather than demand driven as in the case of guestworkers. While an analysis of such an immigration policy in a pluralistic society undoubtedly is of considerable interest, such a discussion is beyond the scope of this paper.³

3 The Disequilibrium Macroeconometric Framework

This subsection is devoted to a very brief outline of the theoretical framework of the disequilibrium macro-model and the empirical results including a forecast until 1995.

Since the theoretical framework has been surveyed elsewhere, a very short outline should suffice.⁴ When wages and prices are not adjusting fast enough to clear markets at any instant of time, some form of rationing is observed. On each micro market for labor or goods transacted quantities can be constrained by demand or supply. To begin with the labor market, in the absence of labor hoarding, transacted labor (i.e., employment LT) is the minimum of labor supply (LS), labor demand based on expected goods demand (L^*), and labor demand brought about by production capacities (L_{YC}). These minimum conditions hold for micro markets. It can be shown that under reasonable economic arguments the statistical distribution of demand and supply on the micro markets follows a joint log-normal distribution.⁵ Following Lambert (1988), aggregate transactions can then be approximated by a CES-type function of the aggregate concepts of demand and supply. For the labor market this procedure yields the following

³See Franz (1993) for more details upon this issue.

⁴See e.g. Franz and König (1990), Franz and Heidbrink (1992).

⁵For a derivation of this result see Smolny (1993).

expression for employment (LT):

$$LT = [LS^{-\rho_{LT}} + (L^*)^{-\rho_{LT}} + (L_{YC})^{-\rho_{LT}}]^{-1/\rho_{LT}} \quad (1)$$

where the mismatch parameter ρ_{LT} represents what is mostly understood by the term mismatch on the labor market namely a regional or qualifications mismatch.⁶ Of course, L^* and L_{YC} are not observed and must be estimated. Similar considerations apply to the goods market. More specifically, the equation for goods transacted (YT) is:

$$YT = [Y_{LT}^{-\rho_G} + YD^{-\rho_G}]^{1/\rho_G} \quad (2)$$

Y_{LT} is output which can be produced by full utilization of productive capacities, i.e., employment times labor productivity at full utilization of labor. YD represents goods demand which is also not observed. In estimating YD the model takes into account various spillover effects such as from domestic constraints on international trade and vice versa. The parameter ρ_G measures the mismatch of productive capacities on the goods market. As firms do not have perfect information about goods demand at the time of the employment decision, the size of ρ_G depends, among other factors, on the adjustment speed of employment with respect to changing conditions on the goods market. For ρ_{LT} and ρ_G approaching infinity eqs. (1) and (2) tend to the usual minimum-condition. Then not only each micro market but also the aggregate economy is subject to only one of the constraints.

The upshot of these considerations can be displayed very intuitively by the proportion of firms ("regimes") being constrained either by labor supply (π_S), productive capacities (π_C) or expected goods demand (π_D). Figure 2 displays these regimes as one of the estimation results of the whole disequilibrium model covering the time period 1961 to 1988 (quarterly data). As can be seen, the periods 1961 – 66 and 1968 – 1973 are characterized by a preponderance of capacity and labor supply constraints (π_C and π_S , respectively). The goods demand constraints (π_D) become dominant in the recession periods with peaks in 1967, 1975 and 1982/83. After 1984 an increasing importance of capacity constraints can be observed in due course of restrictive monetary and fiscal policies pursued in the beginnings of the eighties leading to an investment squeeze.

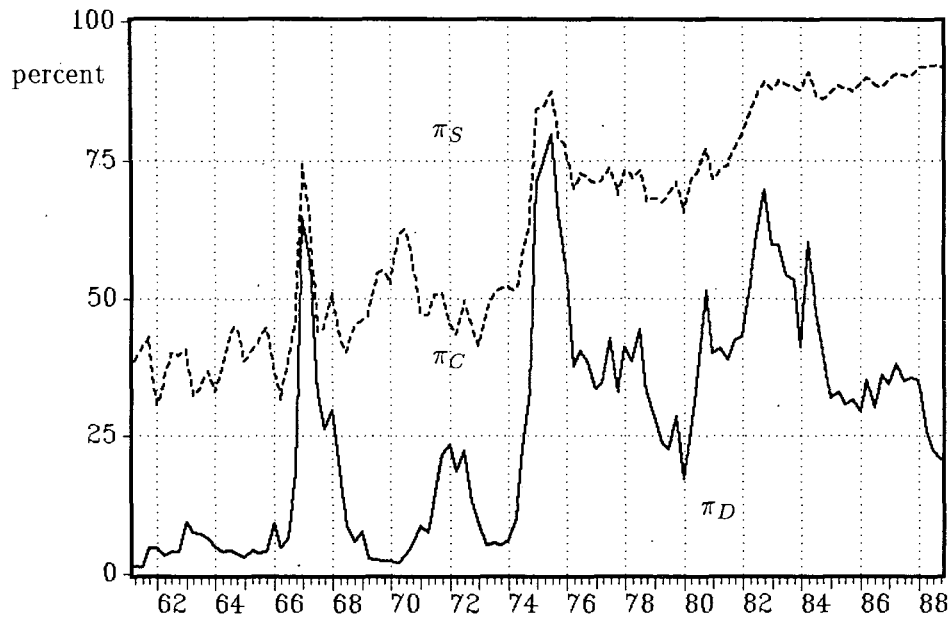
The model presented so far has undergone two modifications which constitute parts of the novelties of this paper. First, several behavioral equations have been modified in order to allow for additional channels for migration effects. Second, a forecast up to 1995 is made which serves as the baseline solution to be compared with the simulated values outlined in section 4.

To begin with the modifications of behavioral equations, these concern consumption, wage determination, and the equations for output and employment, respectively.

With respect to consumption, the standard consumption function with real disposable income, real interest rate and the unemployment rate as the explanatory variables is modified so that the average propensity of consumption depends on the share of foreign workers and the unemployment rate. The reason is, firstly, to test whether foreigners have a higher or lower rate of consumption compared with domestic consumers: On the one hand one might argue that they want to achieve the prevailing standard of living as soon as possible, on the other hand, the "target saver" may wish to reach his target more quickly by a higher propensity of saving. Secondly, the dependence of the average propensity of consumption on the unemployment rate reflects the observation that

⁶See Franz (1991) for details.

Figure 2: Regime Proportions^{a)}



a) See text for details.

unemployed persons have a higher propensity of consumption (although they consume less due to their reduced income). As a counterargument, standard life cycle theory of consumption suggests that a lower probability to receive future incomes (approximated by a higher unemployment rate) lowers current consumption.

The estimated dynamic version of such a consumption function is given in appendix A. Estimation has been carried out by TSLS. An alternative estimation with ratios such as the average rate of consumption gave results which did not differ substantially. Thus, the level version was included in the simulation model. The dependent variable is real consumption expenditures.

The estimation results show that in the short-run foreigners consume more than Germans but in the long-run solution foreigners wind up with a higher savings rate compatible with the "target saver" motive. Moreover, current unemployment has a negative sign, whereas lagged unemployment exhibits a positive value slightly higher than the coefficient associated with current unemployment.

Wage determination is also subject to the influence of foreign workers. Two effects emerge which work in the opposite direction, however. First, foreign workers typically take over low paying jobs which calls for a negative impact on wage growth. On the other hand, filling those jobs with foreigners enables firms to promote domestic workers by offering higher qualified jobs to them (after some internal or external training). From this we expect a positive effect of foreign workers on wage growth. Our wage equation is specified and estimated as an error correction model with nominal wage inflation as the dependent variable. Prices, productivity, wedge variables, and the unemployment

rate (and their growth rates) serve as the explanatory variables.⁷ In the long-run solution given by the error correction term of the estimated equation, the restriction of a unit elasticity of nominal wages with respect to prices and productivities can not be rejected. In addition, the proportion of foreign workers turns out to have a significant influence in the error correction term. More precisely, there exists a positive level effect of this proportion on wages which outperforms the negative substitution effect mentioned before.⁸ The estimation results are given in appendix A, too.

We also made considerable efforts to test whether effects of foreign workers can be identified in the CES-functions for output and employment, respectively [eq. (1)]. The most obvious channel is through the mismatch parameters ρ_G and ρ_{LT} . As has been shown in section 3, the mismatch parameter ρ_G in eq. (2) reflects the adjustment speed of employment with respect to changing conditions on the goods market. Emigrants might contribute to an increase of this speed due to their mobility especially when they enter Germany with no clear preferences for special regions and/or branches. This effect is not rejected by the estimation of

$$\rho = \alpha_0 + \alpha_1 \cdot t + \alpha_2 \cdot t^2 + \alpha_3 \cdot \log s \quad (3)$$

where t is the time trend and s the share of foreign workers. The mismatch parameter increases with s , that means the mismatch is reduced to a considerable amount, with a higher share of foreign workers. The coefficient α_3 is highly significant in the estimated version of equation (3) and quite robust with regard to different samples or functional forms for the influence of s . With a growing value of s this effect becomes lower, however. A similar result is obtained for the mismatch parameter ρ_{LT} in eq. (1). This mismatch parameter represents what is mostly understood by the term mismatch on the labor market such as a regional or qualification mismatch.⁹ The estimation results for the CES-functions for output and employment are also described in appendix A.

4 A Simulation Experiment

The simulation experiment refers to the time period 1989 to 1995. Since the estimation period of our model covers the period 1961/1 to 1988/4 (quarterly data) a forecast up to 1995 is made which serves as the baseline solution to be compared with the simulated values of major endogenous variables.

The assumptions concerning the development of the exogenous variables are contained in appendix B. In order to concentrate on the direct effects of migration fiscal and monetary policies are exogenous with regard to immigration flows. The proportion of the public sector with reference to GDP was treated as constant from 1989/1 on. The monetary authorities were assumed to accomodate the effects of different immigration scenarios, i.e. the nominal interest rates were regarded as exogenous to influences of migration. These assumptions rest on the aim of this section, to evaluate the “pure” effects of immigration (see conclusions). Together with public expenditures, net export of goods and services between the old and the new states, which are afflicted with measuring errors from 90/3 on, form the exogenous components of aggregate commodity demand.

⁷ See Franz and Gordon (1993) for a more detailed analysis of wage determination.

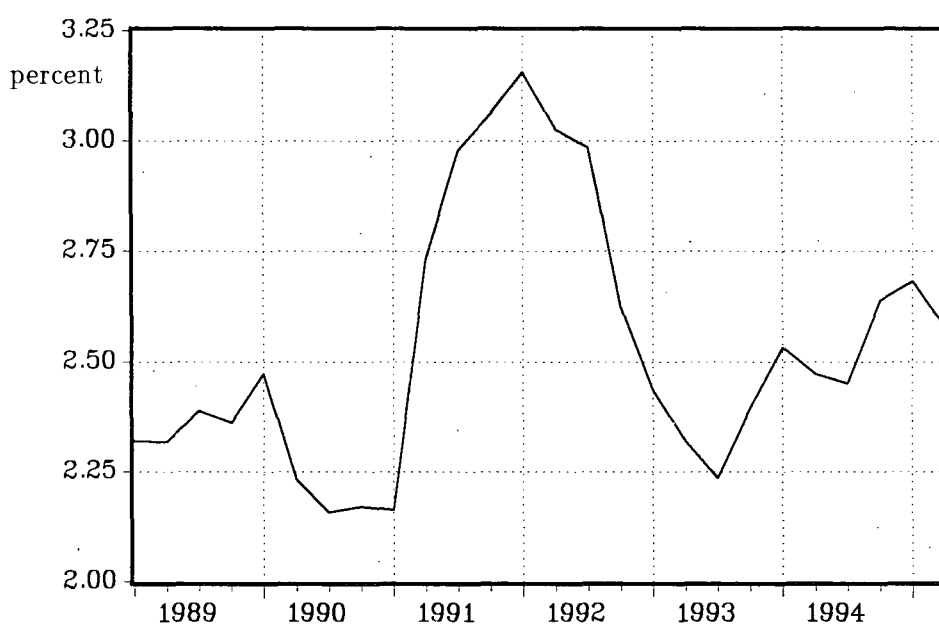
⁸ See Gehring et al. (1992) for a theoretical comparison of the conflicting effects.

⁹ See Franz (1991) for a more detailed analysis of mismatch on the German labor market.

Labor supply data for Germans are based on actual figures and on projections by the Institute of Labor Research (IAB).¹⁰ The figures for the development of GDP, exchange rates and import expenditure for Germany's major trading partners for 1993 and 1994 refer to information published by the OECD, with the growth rates being held constant for 1995.¹¹

Figure 3 displays the development of the growth rate of real wages employment during the period 1989/1 to 1995/2 as predicted by the model, given the forecast of the exogenous variables for this period.¹² Although forecasting is not the issue under consideration, table 4 compares, for 1989 to 1992, actual values of some major economic variables with our predictions in order to obtain an impression of the accuracy of the model.

Figure 3: Predicted real wage growth rate^{a)}



a) See text for details.

As can be seen the model overestimates the growth rates for hourly nominal wages and prices. This might be due to a "reunification effect" on nominal wages which could not be included in the estimated model for 1961/1 – 1988/4. The overestimation of the growth rate for real wages in 1992 reflects the fact that in 1992 wage contracts were heavily influenced by the discussion on the costs of reunification. Thus, the nominal wage increase fell short of its "normal" level defined by the increase in prices and labor productivity explaining the strike movement in spring 1992.

Given the unique situation in Germany after 1988 which is not taken into account by the estimation of the behavioural equations the forecasted values of the endogenous

¹⁰Source: Information given by IAB.

¹¹Source: OECD Economic Outlook 53.

¹²Note that we employ a fully dynamic forecast, i.e., (lagged) endogenous variables are the result of the model's forecast rather than known actual values (until 1992).

variables are within tolerable ranges. With respect to the predicted values for real GNP growth which play a more important role in our model, it may be noted that the German Council of Economic Experts (CEE) predicted in November 1991 (1992) a real GNP growth for 1992 (1993) of 1.5 (0) percent.¹³ While our model forecasts are very close to these values, this means, of course, no glossing over the forecast error especially for 1993 with an actual real GNP growth of about -1.5 to -2 percent.

Table 4: Growth rates of actual and predicted variables in percent^{a)}

	1989		1990		1991		1992	
	actual ^{b)}	pre-dicted	actual ^{b)}	pre-dicted	actual ^{b)}	pre-dicted	actual ^{b)}	pre-dicted
hourly nominal wages	+3.84	+5.40	+5.78	+6.36	+6.73	+7.87	+5.79 ^{c)}	+8.68 ^{c)}
prices ^{d)}	+2.58	+3.01	+3.36	+4.20	+4.08	+4.89	+ 4.46	+5.70
real wages	+1.26	+2.39	+2.42	+2.16	+2.65	+2.98	+1.33	+2.99
real GNP	+3.93	+3.36	+4.73	+3.03	+3.55	+2.15	+0.88	+1.65
real investment ^{e)}	+7.30	+2.48	+9.95	+1.89	+8.01	+1.66	-0.71	+ 2.25
degree of capacity utilization ^{f)}	89.1%	89.2%	89.6%	90.9%	87.5%	90.9%	85.1% ^{c)}	89.6% ^{c)}
employment ^{g)}	+1.58	+2.72	+3.25	+ 2.89	+2.77	+1.69	+1.16 ^{c)}	+1.60 ^{c)}

a) See text for explanations.

b) Source: DIW Wochenbericht, various issues.

c) Only first three quarters.

d) GNP-deflator.

e) without public sector and housing.

f) absolute values.

g) without public sector.

The regime shares discussed in section 3 are more in the center of interest. Their time pattern predicted for the period 1989 to 1995 is exhibited in figure 4 by the solid lines. At the beginning of the simulation period 1989 we observe a share of firms constrained by existing capacities of about 70 percent whereas nearly 20 percent are constrained by goods demand and only 10 percent by labor supply. Not surprisingly, as time passes the latter regimes lose most of their importance. Moreover, given the tremendous "exports" of goods from West to East Germany¹⁴ only a negligible amount of firms are still constrained by goods demand until 1992. After that year, however, the West German economy is predicted to face a recession and, moreover, goods demand from East Germany falls short of its previous high levels. This explains why the share of demand constrained firms approaches in 1995 its 1982-recession level. On the other

¹³See Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, Jahresgutachten 1991/92, p.10 and 1992/93, p.3.

¹⁴For example "exports" from West to East Germany in 1991 amounted to some 200 billion DM, i.e., some 8 percent of West Germany's GNP.

Table 5: Net Inflows 1989 to 1995^{a)}

	1989	1990	1991	1992	1993	1994	1995
Commuters	—	75	292	352	290	290	290
Germans ^{b)}	344 (241)	395 (276)	171 (137)	105 (102)	45 (50)	20 (20)	20 (20)
German ethnics	377 (188)	397 (205)	204 (154)	198 (116)	160 (91)	96 (54)	96 (51)
Foreigners ^{c)}	150 (94)	150 (72)	169 (72)	167 (73)	160 (72)	160 (72)	160 (72)
Asylum seekers ^{d)}	121 (32)	193 (30)	246 (123)	394 (223)	285 (153)	240 (120)	240 (120)

- a) See text for explanations; figures in brackets denote labor supply;
b) until October 90: migrants from the former German Democratic Republic;
the figure in bracket may be greater than the corresponding figure in the first row
due to differences in labor force participation rates;
c) excluding asylum seekers;
d) gross inflows for the figures not in brackets.

hand, due to the expected high inflow of foreigners and German emigrants there is virtually no firm being constrained by available labor supply. Table 5 highlights the assumptions being made concerning the inflow of various groups. While the figures 1989 to 1992 mostly refer to actual and therefore known values, the data for the period 1993 to 1995 are based on projections by the Institute of Labor Research (IAB), Nuremberg.¹⁵ Multiplying these net inflows with their expected labor force participation rate¹⁶ gives the net inflow of labor suppliers (figures in brackets).

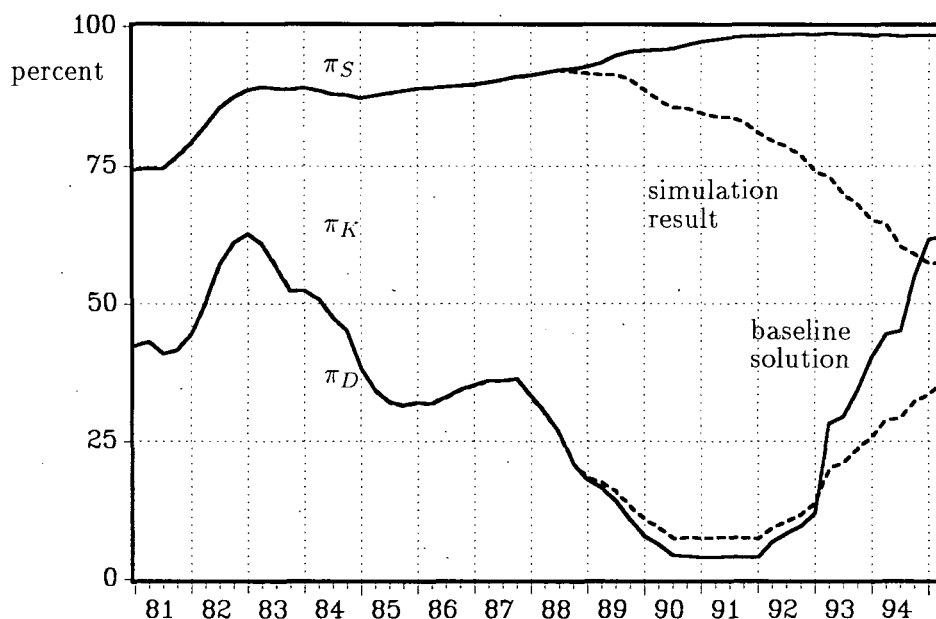
In order to obtain some estimates about current and future effects of these immigration flows, the following hypothetical simulation experiment is carried out. It is assumed that the numbers in table 5 hold only for foreigners and commuters. Put differently, the inflow of people migrating from East to West Germany, German ethnics, and asylum seekers is hypothetically reduced by 75% from 1989 on. The reason for these differences in controlling inflows are that, firstly, the inflow of foreigners consists mostly of EC-nationals and non-EC-nationals due to family unification. Both groups are barely under governmental influence. Secondly, the inclusion of commuters has technical reasons since it is unknown to what extent they consume directly in West or East Germany. All other groups are assumed to be under governmental control. This seems more obvious for asylum seekers and German ethnics rather than for migrants from East to West Germany. Given that our experiment is deliberately hypothetical anyway and neglecting constitutional regulations, one might think of governmental incentives for people to stay in East Germany or even of temporary restrictions to move from East to West Germany.

In light of the present political debates in Germany, it should be stressed again that the experiment is only carried out to evaluate some economic effects of existing and forecasted migratory movements. It goes without saying that no claim whatsoever is

¹⁵Sources: Mitteilungen aus der Arbeitsmarkt- und Berufsforschung, vol. 4/89 and 4/90; information given by IAB ; estimates by the authors.

¹⁶ibidem.

Figure 4: Regime Proportions^{a)}



a) See text for details.

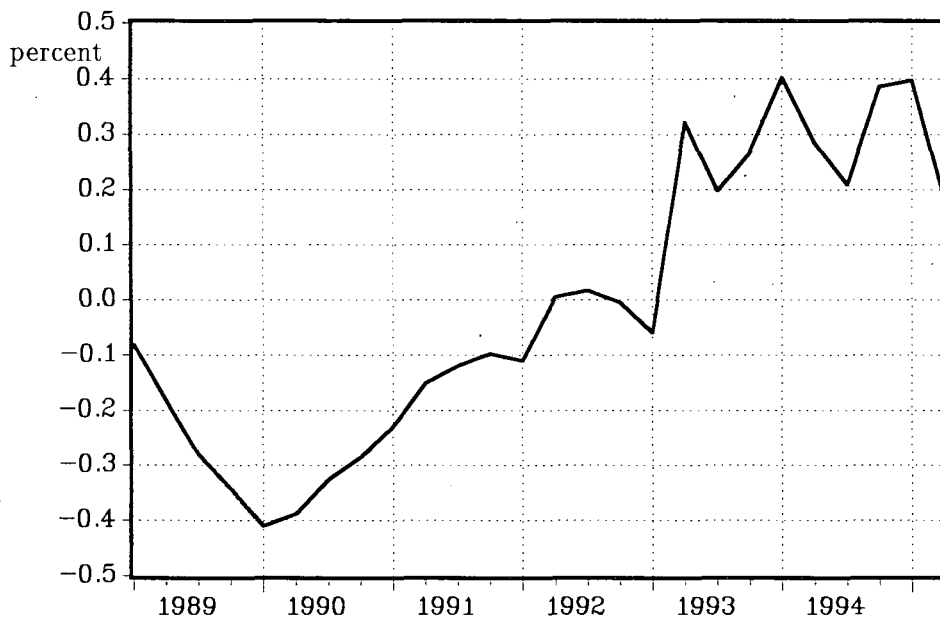
made that the hypothetical simulation should form a basis for policy recommendation and the like.

The development of the regime shares gives a first impression of the consequences of the simulation experiment. The dotted lines in figure 4 show firstly that the share of firms constrained by labor supply gains importance. Due to the decreasing domestic labor supply the still existing, albeit reduced inflow of migrants is not sufficient to remove labor shortages completely. Note that during 1990 to 1992 the decline in domestic labor supply amounts to 67,000 persons per year whereas the same figure for the period 1993 to 1995 is some 100,000 persons per year.¹⁷ This is one explanation as to why the labor shortage regime does not decline or even vanish in the recession period 1993 to 1995. The other explanation is based on the development of the share of firms being rationed by aggregate demand. As can be seen this share exceeds the baseline solution slightly between 1989 and 1992 but falls short afterwards. The reason for the first observation is the lack of consumption expenditures stemming from the reduced inflow of migrants: Between 1989 and 1992 this reduction amounts to 2.5 mill. persons compared with 975,000 persons between 1993 and 1995. This gap of aggregate demand, however, causes a slowdown of the enlargement of capacities. Consequently, less firms have problems fully utilizing their lower capacities after 1992.

This description of the development of the regime shares can be complemented by a discussion of several other variables. For the sake of brevity, we concentrate on the development of growth rates of GNP, real wage rate, and (un-) employment. To begin with, figure 5 shows that until 1992 GNP growth rates fall short of the baseline solution

¹⁷Source: information given by the IAB 7.1.1993.

Figure 5: Difference between simulated and predicted real GNP growth rates^{a)}

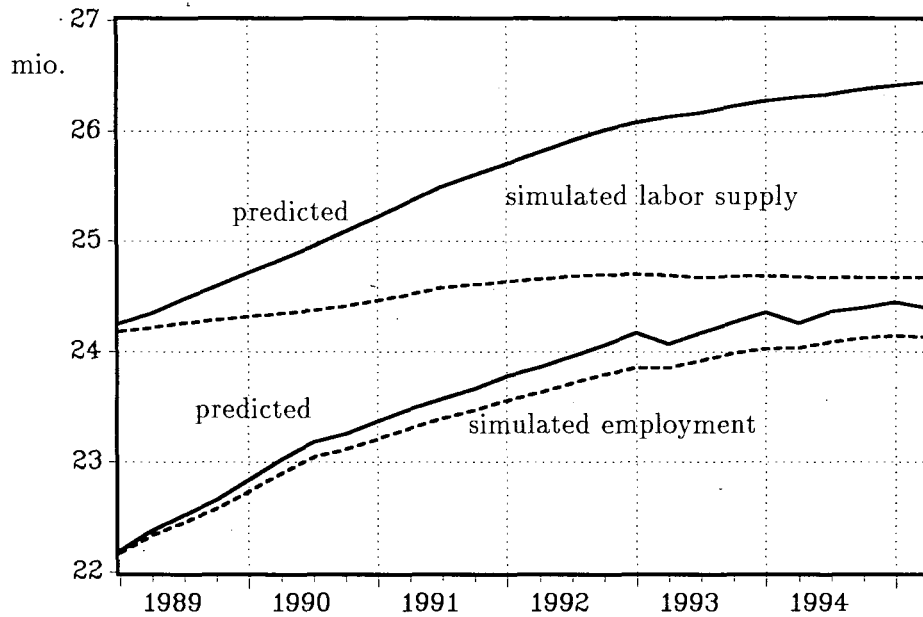


a) See text for details.

with a trough of -0.35 percent in 1990. As has been mentioned this is due both to a decline in aggregate demand and a higher share of firms rationed by available labor supply so that they are, in the short run, forced to shrink their production. However, after 1992 real GNP growth rates exceed the path of their baseline solution with peaks of +0.5 percent in 1994/2 and 1995/1. This outcome is the result of two effects working in opposite directions. First, given labor supply shortages firms, in the medium term, switch to more capital intensive production and invest more. This causes real GNP to increase. This switch is supported by the behaviour of the real wage rate. Less immigrants reduce labor supply and induce higher nominal wage increases. Because price inflation is smaller than wage inflation, real wage growth exceeds its baseline solution and gives incentives for firms to substitute away from labor. Second, as in the period 1989–1992, there is an increasing share of firms which are rationed by available labor. This causes real GNP to fall. Our simulation for 1992 to 1995 suggests that the first effect outperforms the second, albeit to a small extent. Note, however, that the absolute values of GNP and employment fall short of the predicted levels for the whole simulation period.

Not surprisingly, unemployment is lower due to the reduction of labor supply which is a limiting factor of production in the baseline solution. Despite the recession unemployment declines to about 2 percent at the end of the simulation period. Simulated unemployment consists virtually of frictional unemployment in 1995 compared with a predicted 8 percent mark as the baseline solution. On the other hand, employment is also slightly lower as can be seen from figure 6 (some 300.000 persons since 1992, i.e., about 1.2 percent of total employment). As has been discussed before, this is also the result of the increase of the real wage rate due to higher labor supply shortages.

Figure 6: Predicted employment in the private sector^{a)}



a) See text for details.

5 Conclusion

The purpose of this paper was to take another look at the macroeconomic consequences of migration by making use of a macroeconomic disequilibrium model. More specifically, which consequences are to be expected for the foreseeable future? We evaluate impacts of the immigration of migrants from East to West Germany, German ethnics, and asylum seekers.

What, if anything, can be learnt from these exercises? Disequilibrium models pay equal attention to demand as to supply constraints. Therefore, they are better designed to capture effects which may correspond to intuition, namely that the consequences of restricting immigration are more dramatic when the labor market is tight than when the economy experiences high unemployment. Moreover, there are many channels through which immigration may have an impact on unemployment and output: through changes of the regime proportions, through investment and, hence, capacity building, and, more indirectly through induced wage and price inflation. Since some of those effects work in the opposite direction an econometric assessment is warranted and that was exactly what this paper attempted to do.

As usual our list of caveats is long. Besides some shortcomings of the model mentioned in the text, this paper does not address other important effects of immigration such as on social security, education, housing, and income distribution. Although highly desirable a treatment of these aspects is beyond the scope of this study.

This concerns also the treatment of monetary and fiscal policies. As has been emphasized we deliberately wanted to simulate effects stemming from migration for a given macropolicy. It is obvious that different policies can attempt to support or mitigate

some outcomes of our simulation experiment. These aspects remain on the research agenda, too.

A Estimation Results for Modifications of the Disequilibrium Model

Consumption:

$$\begin{aligned}
 C_t = & 11.12 - 16.135SEAS_1 - 6.621SEAS_2 - 13.679SEAS_3 \\
 & (5.82) \quad (-8.09) \quad (-4.19) \quad (-6.67) \\
 & + 0.316C_{t-1} + 0.109C_{t-2} + 0.190C_{t-3} \\
 & (3.28) \quad (1.104) \quad (2.09) \\
 & + (0.448 - 0.007UR_t)Y_t^{dis} + (-0.170 + 0.008UR_{t-1})Y_{t-1}^{dis} \\
 & (9.44) \quad (-2.12) \quad (-3.39) \quad (2.22) \\
 & + (-0.115 + 0.012s_{t-2})Y_{t-2}^{dis} + (0.186 - 0.013s_{t-3})Y_{t-3}^{dis} \\
 & (-1.59) \quad (2.61) \quad (2.72) \quad (-3.19) \\
 & - 0.235r_{t-1} \\
 & (-3.00)
 \end{aligned}$$

Sample: 61/4 – 88/4; t-values in parenthesis

R²: 0.999; Standard Error of Estimation (SEE): 1.406

Box–Pierce Q-Statistic (12 lags): 10.23

C : real consumption

$SEAS_i$: seasonal dummy

UR : unemployment rate

Y^{dis} : real disposable income

s : share of foreign workers

r : real short term interest rate

Wages:

$$\begin{aligned}
 \Delta \log W_t = & -0.176 - 0.003SEAS_1 + 0.037SEAS_2 + 0.039SEAS_3 \\
 & (-5.07) \quad (-0.41) \quad (2.93) \quad (4.76) \\
 & - 0.004 \Delta \log W_{t-1} - 0.074 \Delta \log W_{t-2} \\
 & (-0.045) \quad (-1.00) \\
 & - 0.105 \Delta \log W_{t-3} + 0.590 \Delta \log W_{t-4} + 0.133 \Delta \log W_{t-5} \\
 & (-1.53) \quad (8.31) \quad (1.47) \\
 & + 0.286 \Delta \log P_{t-2} + 0.267 \Delta \log WEDGE_{t-2} - 0.003UR_t \\
 & (2.05) \quad (3.73) \quad (-4.34) \\
 & - 0.297(\log W_{t-1} - \log P_{t-1} - \log YL_{t-1}) + 0.002s_{t-1} \\
 & (-5.58) \quad (2.60)
 \end{aligned}$$

Sample: 61/3 – 88/4; t-values in parenthesis

R²: 0.970; Standard Error of Estimation (SEE): 0.0105

Box–Pierce Q-Statistic (12 lags): 8.85

W : nominal hourly wage

$SEAS_i$: seasonal dummy

P : GNP-deflator

$WEDGE$: wedge

UR : unemployment rate

YL : labor productivity

s : share of foreign workers

CES-function for goods market:

$$YT_t = (Y_{LT,t}^{-\rho_G} + YD_t^{-\rho_G})^{-\frac{1}{\rho_G}} - 0.278 SEAS_1 + 0.203 SEAS_2 + 0.154 SEAS_3 + (0.278 - 0.203 - 0.154) SEAS_4$$

(-1.20) (0.87) (0.67)

where

$$-\rho_G = -48.678 + 1.745t - 0.011t^2 - 22.43\log s$$

(-5.89) (6.66) (-6.23) (-3.35)

Sample: 61/1 – 88/4; t-values in parenthesis

R²: 0.999; Standard Error of Estimation (SEE): 1.4117

YT: output

Y_LT: output determined by employment times optimal productivity

YD: aggregate demand

ρ_G: mismatch parameter for goods market

SEAS_i: seasonal dummy

t: time trend

s: share of foreign workers

CES-function for labor market:

$$LT_t = (LS_t^{-\rho_{LT}} + (1 + 0.043)(L_t^*)^{-\rho_{LT}} + L_{YC,t}^{-\rho_{LT}})^{-\frac{1}{\rho_{LT}}} - 0.017 SEAS_1 - 0.034 SEAS_2 + 0.050 SEAS_3 + (0.017 + 0.034 - 0.050) SEAS_4$$

(12.70) (-0.86) (-1.77) (2.57)

where

$$-\rho_{LT} = -62.925 + 2.547t - 0.014t^2 - 38.285\log s$$

(-7.13) (9.53) (-8.17) (-5.45)

Sample: 61/1 – 88/4; t-values in parenthesis

R²: 0.988; Standard Error of Estimation (SEE): 0.1173

LT: employment (without public sector)

LS: labor supply

L*: labor demand based on expected goods demand

L_{YC}: labor demand derived from existing capacities

ρ_{LT}: mismatch parameter for the labor market

SEAS_i: seasonal dummy

t: time trend

s: share of foreign workers

B Major exogeneous variables 1989–1995

variable	1989	1990	1991	1992	1993	1994/95
value added tax rate	14%	14%	14%	14%	15%	15%
governmental value added as percentage of GNP	const.	const.	const.	const.	const.	const.
imports by USA ^{a)}	+6.1%	+3.0%	-0.1%	+9.6%	+7.0%	+6.7%
imports by UK ^{a)}	+7.1%	+1.0%	-3.1%	+5.1%	+4.1%	+5.5%
imports by France ^{a)}	+8.3%	+6.3%	+2.9%	+3.0%	+1.3%	+4.2%
imports by Italy ^{a)}	+9.6%	+8.0%	+2.9%	+4.6%	+0.6%	+4.5%
imports by Netherl. ^{a)}	+4.9%	+4.9%	+3.7%	+1.7%	+0.5%	+3.2%
imports by Belgium ^{a)}	+9.0%	+4.6%	+2.7%	+1.2%	+0.4%	+2.1%
GDP UK ^{a)}	+2.3%	+0.5%	-2.2%	-0.6%	+1.8%	+2.9%
GDP France ^{a)}	+3.4%	+2.5%	+0.7%	+1.3%	-0.7%	+1.5%
GDP Italy ^{a)}	+3.1%	+2.1%	+1.3%	+0.9%	-0.2%	+1.7%
GDP Netherl. ^{a)}	+4.3%	+3.9%	+2.2%	+1.5%	-0.3%	+1.4%
GDP Belgium ^{a)}	+4.2%	+3.3%	+2.0%	+0.8%	-0.7%	+1.2%
world trade ^{a)}	+2.3%	+3.8%	+3.6%	+6.2%	+1.0%	+2.3%
working hours ^{b)}	-1.3%	-2.0%	-1.0%	-1.0%	-1.0%	-1.0%
wedge ^{c)}	+1.0%	-1.8%	+3.0%	+2.3%	+0.3%	+0.0%
short term interest rate ^{a)}	7.1%	8.6%	9.4%	9.7%	7.2%	4.8%
long term interest rate ^{a)}	7.1%	8.9%	8.6%	8.0%	6.7%	6.5%
exchange rate USA ^{a)}	1.88	1.62	1.66	1.56	1.63	1.63
exchange rate UK ^{a)}	3.08	2.88	2.93	2.75	2.41	2.41
exchange rate France ^{a)}	0.29	0.30	0.29	0.30	0.30	0.29
exchange rate Italy ^{a)}	1.37	1.35	1.34	1.27	1.10	1.10
exchange rate Netherl. ^{a)}	0.89	0.89	0.89	0.89	0.89	0.89
exchange rate Belgium ^{a)}	0.048	0.048	0.049	0.049	0.049	0.049

a) Source: OECD Economic Outlook, various issues

b) Source: DIW Wochenbericht, various issues, up to 92.4

c) Source: DIW Wochenbericht, various issues, up to 93.4

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