THE WEST GERMAN GASTARBEITER SYSTEM OF IMMIGRATION*

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The paper analyzes the West German immigration system as operated until early 1970s. Defining the essential features of this system, the authors explain the cross-sectional industrywise utilization of foreign guestworkers during 1964/65 to 1971/72. They also extend the analysis to explaining the sourcewise (by country) composition of foreign workers during this period

1. Introduction

Immigration systems are control systems. Governments attempt with their aid to restrict and direct the inflow of migrants. Some systems are ostensibly run on 'non-economic' principles: as in the present United States case where 'familiar' and 'refugee' considerations are much the most important. But other systems, such as the German *gastarbeiter* system, have been run explicitly on 'economic' lines and thus directly invite economic analysis.

This paper is addressed to an economic analysis of the West German *gastarbeiter* (i.e., 'guestworker' or foreign worker) system. Section 2 states the main features of this immigration system, with a view to defining the key institutional aspects that must determine the manner in which we must pose our econometric hypotheses. Section 3 then undertakes the analysis of cross-sectional industrywise utilization of foreign workers in Germany during the period 1964–1965 to 1971–1972: a period which is argued to be suited to such investigation. Section 4 analyzes a different question: since West

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Germany *gastarbeiters* come from different sources (i.e., Yugoslavia, Turkey, Greece, Italy, Portugal, and Spain in the main), what explains the resulting composition of immigrant-inflow into Germany?

2. The *gastarbeiter* system: Key features and consequent hypotheses

The most important aspect to note in analyzing international, as distinct from internal, migration is that the former is generally subject to controls whereas the latter is generally not. The analyst, therefore, has to grasp clearly the behavior of the government in regard to the control of the immigration flows. In analyzing issues such as the overall inflow, the destination-by-sector composition and the source-of-origin composition of immigrants, the precise forms of the immigration system are clearly critical since they must have a decisive impact on these outcomes.

2.1. *Key features of the gastarbeiter system*

The German *gastarbeiter* system, in the years of its operation until 1973 when major new restrictions were adopted in light of the difficult macro-economic situation, was devised and operated during a period of virtually full employment characterized by around 0.5% unemployment rate. It had, in consequence, the following important features: (i) the government did *not* impose prior limits (like in the U.S. system for immigrants) on the number of *gastarbeiters* that would be let in annually; (ii) rather, provided there was no objection from unions and the local authorities, the employers could recruit *gastarbeiters* from foreign countries, so that the annual aggregate inflow was essentially an unplanned aggregate of firmwise decisions; (iii) the importation of *gastarbeiters* by the firms was then principally *via* recruitment abroad, with the aid of official recruiting offices in the major source countries; (iv) the ability of *gastarbeiters* to shift employment away from the initial-recruitment position to other industries and regions was regulated by types of permit and length of stay and was by no means symmetric with the rights of native workers in that regard; (v) German labour law forbade, in principle, the recruitment of foreign labour except at identical wages with native German labour in identical jobs.

While several writers have described the German *gastarbeiter* system in a way supportive of the critical description above, we might cite Mehrlaender (1979, 1980) in brief support. Thus, Mehrlaender (1980, pp. 77–78) writes:

'The conclusion of the [Italy-German] agreement on recruitment was preceded, however, by consultations among relevant German agencies, including the Federal Government, representatives of the Federal Employment Agency, the employers and the trade unions. The employers were interested primarily in reaching a decision in principle to

encourage recruitment of foreign workers. In contrast, the trade unions foresaw the danger that (non-union) labor might be utilized to keep wages down, and, for that reason, demanded that foreign workers should be accorded the same rights with regard to wages and social benefits as their German counterparts. The unions reached agreement on this point with the Federal Government and the employers' representatives.'

Mehrlaender (1979, pp. 149–150) further writes that:

'Residence permits may stipulate geographic areas and time limits. At first, a residence permit is granted for one year only and is tied to designated employment... A foreigner, who has been in Germany, legally, for at least five years and is considered to have integrated himself into the economic and social life, is eligible to receive domicile permit (*Aufenthaltserlaubnis*). Once granted, the permit allows its holder to move within the country without restriction... Work permits are issued by the Federal Labor Office (*Bundesanstalt für Arbeit*). All aliens intending to work in Germany need a work permit. There are two classes of work permits: a general permit, issued normally for one year and geared to the labor conditions prevailing, or to special needs of certain industries; and, there is a special work permit (*besondere Arbeitserlaubnis*), issued to aliens who have a steady employment record for the preceding five years, or who have been living in Germany legally for the last eight years or more, or who are married to a German citizen. This permit may carry a geographical limitation and is normally issued for five years.'

'Generally following the same steps in the recruitment procedures a German employer first notifies his nearest Employment Office (*Arbeitsamt*) about his manpower needs.... When no Germans are available, the request is routed to the Federal Labor Office in Nuremberg. From there, the appropriate German commission in a sending country is notified.'

2.2. Implications of these key features: Hypotheses

Features (i)–(iii) imply that, as long as there were 'shortages' in the German economy for labour, and there were no problems of social unrest resulting from the final magnitude of foreign labour inflow, the government effectively operated with a quasi-open door, letting private firm-level decisions (motivated by joint employer–employee interests) determine the magnitude of the entry through the door.¹

¹The door was not fully open since immigrants could not freely walk in but had to be recruited to come into Germany.

This interpretation of the *gastarbeiter* immigration system, combined with features (iv) and (v), implies immediately that the 'model' that applies in the German case is one where the level and the industrywise composition of immigrant labour are determined by internal 'demand' considerations rather than, as in the free-migration models, the interaction of supply and demand factors.

An idealized way to see the essence of this proposition is to consider fig. 1. The foreign-labour supply curve is depicted as S_F , indicating the availability of labour at wage W_F . The domestic supply and demand curves for labour are S_D and D_D respectively. (The domestic supply curve might well be made sharply inelastic at higher wages than $\bar{W}$ if we hypothesize that German labour supply 'dried up' at that point.) If there were free immigration, YZ amount of foreign labour would come in and the wage would be W_F . If a simple immigration quota were set at QR , the wage would be $\bar{W}$ ($> W_F$) and each immigrant would earn a 'rent' of $(\bar{W} - W_F)$. The German system can be taken to imply that the employers and employees settle on wage $\bar{W}$ and then recruit labour of quantity QR . Native and foreign labour get the same wage $\bar{W}$, as required by feature (v) of the system.² It is then evident that if the S_F

Fig. 1

²A formal recruitment model is called for but is beyond the scope of the present paper. We also could formalize the possibility that, despite the law dictating feature (v), effective discrimination takes place against *gastarbeiter* job reclassification etc. For more analysis of these aspects, see Bhagwati (1982).

curve moves up (but is below $\bar{W}$), it will have no effect on the level of German *gastarbeiter* recruitment and hence inflow: it will simply cut into the *gastarbeiters'* gain from entering Germany. In this precise sense, we have a 'demand-determined' model of international immigration here.³

We thus hypothesize, in section 3 below, that cross-sectional differences among several sectors in the growth of their use of foreign relative to domestic labour during the decade 1964–1965 to 1971–1972 — a period whose choice we justify presently — reflect the cross-sectional differences in factors affecting the growth of demand for them and hence for labour.⁴

How does such a 'demand-determined' immigration system work in regard to the source-composition of immigrants? Let us first note the factors why the results may diverge from those in the free-immigration models, noting next the factors that, however, lead to similar results. If all foreign workers in the German workplace must be paid the same wage, then one could argue that the employers may choose randomly, regardless of wage differences at origin. Therefore, at the plant or firm level, one may expect that, over time, the share of workers from different origins will converge towards the mean (i.e., $1/n$ th if there are n sources). Correspondingly, we may expect that wage differences among alternative sources have no explanatory power; nor may we expect differences in workforce size among alternative sources to be relevant if the choice of workers is truly random. In all these respects, the free-immigration models yield theoretically, as also in econometric studies [reviewed, among others, by Krugman and Bhagwati (1976) to date], opposing conclusions. Wage (or income, current or permanent) differences at different origins do matter. Initial shares tend to diverge rather than converge: 'one Turk leads to another', i.e., information and supportive networks enable those outside the immigration barriers to get inside. And larger workforces at an origin, *ceteris paribus*, must also imply (like lower wages) a greater inflow into a destination.

But the German model of immigration, once we allow for active recruiting by firms, could still generate results similar to the free-immigration models. For, suppose that lower wage levels and larger workforces imply a relatively greater supply of potential recruits to choose from. Since labour is not homogeneous, it may well be that a better selection of recruits will be available where the pool of applicants is larger. Again, while the information network argument may not hold in the recruitment model, it is possible that

³This precise and particular meaning and characterization of the concept of 'demand-determined' model of international immigration, and its contrast with the usual internal models of migration, were explicitly discussed in Bhagwati (1979). The concept of demand-determined immigration has also been used by Michael Piore to imply instead a situation where firms in the country of immigration actively recruit labour.

⁴Feature (iv) assures, by reducing reallocative mobility within the country, that primary recruitment would tend to be somewhat correlated with the final sectoral destination of *gastarbeiters* over this period. But we do not have the longitudinal or other data to test this hypothesis properly.

firms may prefer to hire from the same source as before since the costs of managing workers primarily speaking foreign languages and with specific cultural attributes will increase with the number of sources tapped. As it happens, our results (section 4) support the hypothesis that the recruitment model of German immigration seems to produce, on balance, source-patterns similar to, rather than different from, those we would expect from the free-immigration models.

2.3. *Choice of period 1964–1965 to 1971–1972*

The choice of period for analysis is usually dictated in analyses such as ours by the availability of matching data on different variables. In the present case, we have lack of necessary data on the employment of foreigners for the years 1973–1976 because the Federal Office introduced a new registration system in 1973 for foreigners and adopted a new industrial classification, so that employment figures for foreign workers by industry were published again, beginning in 1977 only, and leaving us with data only by broad sectors for 1973–1976. Effectively, therefore, we are confined to continuous industrywise data only up to 1971–1972.

However, there is also good and indeed decisive reason to confine our period to before 1973. For, in November 1973, the German *gastarbeiter* system effectively changed in the restrictive direction. Thus, Mehrlaender (1980, p. 79) writes:

‘Until 1973, the Bonn government had left employment of foreign citizens almost entirely to regulation by market forces. The recession beginning at the end of 1973, exacerbated by the oil crisis with its accompanying mass unemployment, caused the FRG [Federal Republic of Germany] to abandon the policy of entrusting the recruitment of foreign workers to the requirements of industry. A decision to halt recruitment came into force at the end of November 1973, and this approach has been maintained to the present. The continued unfavorable situation of the labor market is the most obvious reason for the current policy.’

These changes are evident in fig. 2b where, after 1973, the growth of *gastarbeiters* in Germany virtually ceases, the new (gross) *gastarbeiter* inflow reduces to a fraction, and the foreign population also stabilizes.

It follows therefore that one should expect the underlying model explaining industrywise cross-sectional utilization of *gastarbeiters* to change after 1973. With the break of such importation since 1973, changes in foreign labour utilization by different sectors would represent virtually reallocations, by and large, of a given foreign labour force rather than, as in the pre-1973 period, largely differential net imports of foreign labour. In fact, our attempts

Fig. 2a. Number of and share of foreign wage earners in total wage earners in the Federal Republic of Germany, 1964–1980.

Fig. 2b. Number of foreign workers entering the Federal Republic of Germany, 1968–1980 ($\times 1000$).

Fig. 2c. Number of and share of foreign wage earners in total wage earners in manufacturing sectors in the Federal Republic of Germany, 1964–1980.

at treating the period 1964–1965 to 1979–1980 as one period for analysis in section 3 below yielded no results of significance whereas separating the period into two and considering only the earlier period 1964–1965 to 1971–1972 yielded significant and plausible results: underlining the relevance of our foregoing argument.

3. The growth of gastarbeiters in Germany: A cross-sectional analysis of German industries

The *gastarbeiter* system, as described in section 2, makes it plausible for us to test the hypothesis that, cross-sectionally for ‘industries’ utilizing foreign labour, the rate of growth of such labour utilization would be largely determined by differential growth in their demand.

We therefore used, as our explanatory variables, the *change* in the degree of protection (both nominal and effective) and the rate of growth of value of output. The reason for including both variables, even though one might think that the output effect would fully capture the effect of the change in the degree of protection, is simply that the period is sufficiently short for the output change of protection change not to have worked itself out and the ‘signalling’ effect of the protection change therefore provides added explanatory power: as in fact the econometric results underline. Besides, profitability of additional hiring seems to be better captured by the change in the *value* of output, rather than in real output: as again our results indicate.

We also hypothesized that the growth rate of foreign labour utilization, given the demand factors, would tend to vary inversely with the capital-intensity, especially with capital defined to include skills or human capital.⁵ the search for foreign labour could be balanced in capital-intensive activities by search for capital-using and labour-saving techniques.

We used a 26-sector industry classification, set forth in column (2) of table 1. Of these, we had to omit sector 54–58 because protection data for it were not available. Sector 33 was also omitted as it is already included in sectors 26–27 and 34. Columns (3) and (5) give the estimated nominal rates of protection, whereas columns (4) and (6) give the estimated effective rates of protection for these sectors for 1964 and 1972 respectively. Columns (7)–(9) and columns (10)–(12) give the capital-intensity data for 1964–1965 and 1971–1972, respectively. Finally, columns (13) and (14) give the value-of-production data for 1964–1965 and 1971–1972, respectively.

Table 2, in turn, contains the data on foreign workers, again by our industrial classification, and on total employment within which they are embedded, as also on the source-breakdown by the principal countries of origin, for 1964–1965 and 1971–1972. We should add that these sectors contain virtually 60% of total foreign workers in Germany during 1964–1972.

We present two main regression results, eqs. (1) and (2),⁶

$$\frac{\Delta F}{F} = 113.384 + 0.7901 \frac{\Delta P}{P} + 3.3599 \Delta T_n - 0.8989k, \\ (7.9566)(5.6878) \quad (1.2467) \quad (-4.4748)$$

$$R^2 = 0.6698 \quad \text{adj. } R^2 = 0.6203, \quad \text{SER} = 25.012, \quad (1)$$

⁵Human capital has been measured, as originally suggested by Bhagwati (1964) and Kenen (1965), as the difference between an industry's actual wage and salary sum per worker and the reward for unqualified labour in the same industry.

⁶As usual, the *t*-statistics are given in parentheses. The variance of ($\Delta F/F$) is assumed to be dependent on $(1/F)^2$, i.e., the square of the reciprocal of the initial number of foreign workers. The heteroskedasticity in eqs. (1) and (2) is corrected by weighting the explanatory and dependent variables (including the constant term) with the initial number of foreign workers and estimating the equations with the weighted data by the ordinary least squares method. To investigate the sensitivity of eqs. (1) and (2) to the weighting procedure and the possibility of misspecification, the equations are repeated using the unweighted data. The results are reported as follows:

$$\frac{\Delta F}{F} = 121.151 + 0.5428 \frac{\Delta P}{P} + 6.8261 \Delta T_n - 0.4719k, \\ (5.0831)(3.6724) \quad (2.2494) \quad (-2.0883)$$

$$R^2 = 0.5301, \quad \text{adj. } R^2 = 0.4596, \quad \text{SER} = 28.903$$

$$\frac{\Delta F}{F} = 103.992 + 0.4814 \frac{\Delta P}{P} + 2.8854 \Delta T_n - 0.3137k, \\ (5.0394)(2.9858) \quad (1.8741) \quad (-1.3793)$$

$$R^2 = 0.4991, \quad \text{adj. } R^2 = 0.4240, \quad \text{SER} = 29.839.$$

These equations are not significantly different from eqs. (1) and (2).

Table 1

Industrywise nominal and effective rates of protection, capital-intensity and production, several years during 1964–1965 and 1971–1972 (–1:missing value).^a

Industry (1)	(2)	Nominal and effective tariff protection			
		1964		1972	
		Nominal (3)	Effective (4)	Nominal (5)	Effective (6)
09–11	Chemical industry ^c	14.3 ^e	18.7 ^e	11.2 ^e	14.4 ^e
12–13	Plastics manufacturing ^d	17.0	18.0	11.8	8.4
14	Stone, sand and clay industry	7.9	11.5	3.3	3.7
15	Fine ceramics	14.9	16.1	9.4	9.9
16	Glass industry	17.5	21.8	9.5	11.1
17–18	Iron and steel industry ^c	7.1	25.9	5.1	18.3
19	Foundries	11.9	19.1 ^h	7.7	12.1 ^h
20–22	Steel drawing, cold rolling mills, steel forging	10.2	6.7	7.6	7.7
23–25	Constructional engineering and light metal products	7.7	5.0	4.0	1.4
26–26	Mechanical engineering	9.6	3.5	6.2	2.5
28–30	Manufacture of road vehicles ^f	15.9	12.6	8.6	5.8
31	Shipbuilding	0.8	–13.4	0.4	–10.1
32	Aircraft and aerospace industry	4.0	–3.0	3.2	–0.9
33	Office and data processing machines	–1.0	–1.0	–1.0	–1.0
34	Electrical engineering	11.5	8.0	7.2	4.5
35–36	Precision engineering, optics, clocks and watches	11.5	6.6 ⁱ	7.9	4.5
37	Metal products, n.e.s.	13.1	12.9	7.2	5.6
38–29	Musical instruments, toys, jewellery	13.0	10.2	9.3	6.9
40–42	Sawmills, timber processing, wood processing	13.4	19.8	7.7	10.5
430	Pulp, paper and paperboard	12.6	41.3	9.4	29.6
431–433	Paper manufactures	17.0	24.8	13.2	19.9
44	Printing	8.8	8.4	6.1	5.3
45–46	Leather and leatherproducts	16.3	24.1	7.5	9.9
47–51	Textiles	12.7	24.0	10.3	20.8
52–53	Clothing	16.5	22.3	14.0	20.7
54–58	Food, drink, tobacco	–1.0	–1.0	–1.0	–1.0
09–58	Manufacturing	11.0	14.8	7.4	7.7

^aSources: Cols. (3)–(6): Juergen B. Donges, Gerhard Fels, Axel D. Neu, *Protektion und Branchenstruktur des westdeutschen Wirtschaft* Kieler Studien No. 126 (Tubingen, 1975); Cols. (7)–(12): Rolf Krengel et al., *Produktionsvolumen und -potential, Produktionsfaktoren des Bergbaus und des Verarbeitenden Gewerbes in der Bundesrepublik Deutschland* (Berlin, var. iss.); Cols. (13)–(14): Statistisches Bundesamt, *Fachserie 4, Reihe 4.1, Beschäftigung, Umsatz u.a. der Unternehmen und Betriebe im Bergbau und Verarbeitenden Gewerbe*, var. iss. — Own calculations and estimates.

^bThe industry classification follows the German SYPRO classification. However, the deviations in notes c–k below must be noted.

Physical, human and total capital intensity (DM per employee)

1964–1965			1971–1972			Production (1000 DM)	
Physical (7)	Human (8)	Total (9)	Physical (10)	Human (11)	Total (12)	1964–1965 (13)	1971–1972 (14)
92871	42263	135134	122682	86625	209307	44524609	01523709
27161	18706	45867	37916	41061	78977	8090679	18643630
54147	19679	69826	67455	35595	103050	11568410	21514808
22824	11123	33947	31286	37672	68958	1890850	2393930
28674	20753	49467	45714	49843	95557	2970958	5331522
75996 ^j	27024 ^j	103020 ^j	98444 ^j	61217 ^j	159661 ^j	26592498	40417553
35927 ^h	19732 ^h	55659 ^h	48323	54980	94283	5233577	7163998
48830	19813	68643	61980	37888	99868	9423677	13193073
17780	27696	45456	23075	57727	80802	7733533	13016374
27709	26112	53821	31221	57361	88582	36788657	70024026
48344	30409	76753	53295	57330	110625	25859821	61210000
41414	35743	77157	43103	74821	117924	2589237	4492267
15945	35822	31767	19181	86729	107910	916432	2775422
— 1 ^k	— 1 ^k	— 1 ^k	38056	80565	118621	— 1 ^k	5210474
23617	22836	46453	28689	52438	81127	30038575	64817384
19357	18287	37644	21184	36611	57795	3670559	7896087
22682	15293	37575	34665	36439	71104	14308420	21867433
12324	9817	22141	29957	26877	50834	1725240	3217332
27463	14698	42161	34437	31912	66349	11223418	22289501
78952	21781	100733	98197	50705	148902	4177576	5827597
22769	10891	33660	38463	38678	74141	4796463	6203161
32170	17056	45226	38098	48296	86394	6073305	10145127
16304	16875	33179	28020	36818	64818	5310667	6368747
33207	13530	46737	46067	31733	77820	20356673	27166865
10742	3938	14580	12834	11156	23990	11550085	17186636
68923	14072	82995	79108	26722	105830	51472360	86150801
38641	20884	59525	48891	47362	96253	349886379	631897003

^aIncluding mineral oil refineries;^bIncluding rubber and asbestos industry;^cIncluding non-ferrous metal industry;^dIncluding repair;^eExcluding mineral oil refineries;^fExcluding non-ferrous metal foundries;^gExcluding clock industry;^hExcluding non-ferrous metal industry;ⁱIncluded in items 26–27 and 34.

Table 2
Employment of foreign workers: Total and source composition, 1964–1965 and 1971–1972
(–1: missing value).

1964–1965								
Industry (1)	Total employment (2)	Foreign employment, of which from						
		Total (3)	Turkey (4)	Yugoslavia (5)	Italy (6)	Greece (7)	Spain (8)	Portugal (9)
09–11	626000	30200	1217	–1	8508	7381	5198	162
12–13	259500	24086	1737	–1	5356	8053	5006	364
14	303000	31683	3661	–1	15543	3521	4182	282
15	78000	8996	1013	–1	1730	3250	1977	63
16	90500	9666	1003	–1	3989	1463	1310	457
17–18	570000	23052	4584	–1	3851	4513	4504	484
19	166500	20839	3132	–1	7703	3245	4300	270
20–22	275500	21279	2809	–1	6557	5744	3837	483
23–25	226000	15083	2123	–1	3756	1479	2184	185
26–27	1117000	75463	8840	–1	17904	12421	14658	538
28–30	707000	64247	10590	–1	18437	13474	10436	472
31	78500	4344	1561	–1	540	170	718	318
32	32000	1001	154	–1	103	88	105	6
33	73000	–1	–1	–1	–1	–1	–1	–1
34	1099500	72182	5953	–1	15108	20635	11334	296
35–36	176500	11074	633	–1	2816	2221	2115	65
37	395000	61835	3588	–1	19737	16279	13381	489
38–39	96000	2712	158	–1	839	458	552	12
40–42	446500	27248	2739	–1	10165	4532	4351	279
430	82500	5791	236	–1	1839	1925	1070	53
431–433	146500	10754	550	–1	3415	2770	1821	83
44	249000	6505	273	–1	1295	1181	921	29
45–46	206000	13963	806	–1	3718	2765	3277	27
47–51	612500	64124	5218	–1	19412	17009	10297	951
52–53	478500	25346	2190	–1	6409	4287	4090	109
54–58	806000	37848	1830	–1	8892	6683	9898	211
09–58	9324000	669315	66592	–1	187616	145541	121516	6681

$$\frac{\Delta F}{F} = 112.889 + 0.7044 \frac{\Delta P}{P} + 2.4347 \Delta T_e - 0.8307 k,$$

$$(8.8853)(6.1163) \quad (1.8075) \quad (-4.3027)$$

(2)

$$R^2 = 0.6942, \quad \text{adj } R^2 = 0.6483, \quad \text{SER} = 24.074,$$

where F is the number of foreign workers, P is the output of each industry (in 1000 DM), T_n is the nominal tariff rate (in percent), T_e is the effective tariff rate (in percent), k is the capital (physical-plus-human)-labour ratio (in 1000 DM per employee) and Δ represents the first difference in the relevant variable. All rates of change are expressed in percent.

Eq. (1) uses the change in nominal protection whereas eq. (2) uses the change in effective protection but otherwise they are identical. Eq. (1), with

1971-1972

Total employment (10)	Foreign employment of which from						
	Total (11)	Turkey (12)	Yugoslavia (13)	Italy (14)	Greece (15)	Spain (16)	Portugal (17)
694000	55449	7646	5368	12850	10828	5878	1247
325500	61637	14597	7312	10270	12983	6735	3387
272000	43454	12520	7266	11141	2637	3775	1889
67500	14221	3408	1116	2367	3226	1899	538
97500	17878	4497	1825	4437	1790	1532	1751
462000	39537	16490	3150	4406	5167	3873	1848
14450	30152	10354	3012	7170	3164	3315	1159
263000	36496	10107	4927	7502	6577	3300	1847
187000	33990	6886	11548	4732	2291	2211	539
1240750	173741	39096	38747	26676	22129	16355	3360
852500	142252	39404	20205	26612	24470	13268	3430
72500	11820	5914	1721	725	246	759	719
41000	2767	311	202	269	364	290	15
99500	-1	-1	-1	-1	-1	-1	-1
1220250	182593	37769	39171	25175	36998	12884	1956
191000	25869	3835	6552	5454	3674	2163	523
391000	13584	25801	19328	31933	28851	16257	4121
92000	6554	1239	1262	1610	979	546	62
406000	55328	13697	12147	11082	5919	5375	1793
71000	12237	1969	1839	2764	3284	1338	403
154000	22726	4594	2759	5132	4726	2277	629
264500	16154	2109	2167	3087	3201	1358	163
156500	22987	4171	4420	4517	3391	3052	259
516000	117581	31934	14623	23606	19998	9207	8218
419500	55033	12943	9350	12151	7914	3349	1265
821000	81002	15812	15166	12549	10916	12289	2665
9422500	1397317	327019	235179	258211	225717	133280	43778

an $R^2=0.67$, and with all estimated coefficients significant,⁷ shows that the rate of change of foreign workers ($\Delta F/F$) between 1964-1965 and 1971-1972 is positively related to the change in productivity ($\Delta P/P$) and (not significantly) to the change in nominal protection (ΔT_n) but inversely related to overall capital-intensity (k). Eq. (2) represents even a marginally better fit, with $R^2=0.69$. This equation is also better since the shift to the more appropriate measure of protection, i.e., effective protection, makes the estimated coefficient (2.43) almost significant at the five percent level.

⁷All estimates are significant at a one percent level, except that the estimated coefficient for ΔT_e is significant at ten percent level and that for ΔT_n is not significant. The latter two were, however, included in the equation because we believe that they are important variables to explain the effects of protection on the inflow of foreign workers.

Therefore, eqs. (2) clearly dominates, conceptually and by statistical criteria, eq. (1) and must be preferred.

The inverse relationship to overall capital-intensity may be discussed further. It presupposes that, the more capital-intensive an industry, the more it will respond to growing demand by economising on labour-use rather than by importing foreign labour, *ceteris paribus*. I.e., there should be a positive relationship between change in the degree of capital-intensity and capital-intensity in the data. There is, in fact, empirical support for this relationship. For our data, we estimate

$$\begin{aligned} \Delta k &= 17.121 + 0.3569k, \\ &\quad (4.2769) (5.5063) \end{aligned} \quad (3a)$$

$$R^2 = 0.5795, \quad \text{adj. } R^2 = 0.5604, \quad \text{SER} = 8.5746,$$

where $k = 1000 \text{ DM (human + physical) per employee}$. Other measures of capital-intensity show the same relationship:

$$\begin{aligned} \Delta k_p &= 2.3976 + 0.2312k_p, \\ &\quad (1.2156) (4.7921) \end{aligned} \quad (3b)$$

$$R^2 = 0.5107, \quad \text{adj. } R^2 = 0.4885, \quad \text{SER} = 5.037,$$

$$\begin{aligned} \Delta k_h &= 7.6314 + 0.9123k_h, \\ &\quad (2.8052) (7.5466) \end{aligned} \quad (3c)$$

$$R^2 = 0.7214, \quad \text{adj. } R^2 = 0.7087, \quad \text{SER} = 5.279,$$

where k_p is the physical capital-labour ratio and k_h is the human capital-labor ratio.

A word on what we did *not* find is in order as well. We could not find evidence that differential changes in the availability of domestic workers or their cost as measured by real wages had an impact on the demand for, and hence importation of, foreign labour. Using the real wage rate (W) obtained by deflating by the German CPI and domestic employment (D) for each sector, we obtained the best regressions as follows:

$$\begin{aligned} \frac{\Delta F}{F} &= 158.072 + 0.3798 \frac{\Delta P}{P} + 1.9165 \Delta T_n - 0.9628k \\ &\quad (3.6131) (1.0705) \quad (0.6218) \quad (-4.5360) \\ &\quad -0.1091 \frac{\Delta w}{w} + 1.0596 \frac{\Delta D}{D}, \end{aligned} \quad (4a)$$

$$(-0.1313) \quad (1.3615)$$

$$R^2 = 0.7070, \quad \text{adj. } R^2 = 0.6256, \quad \text{SER} = 24.83,$$

$$\begin{aligned} \frac{\Delta F}{F} = & 149.405 + 0.4328 \frac{\Delta P}{P} + 1.5003 \Delta T_e - 0.9090k \\ & (3.4854)(1.1876) \quad (0.8012) \quad (-4.2673) \\ & -0.1657 \frac{\Delta w}{w} + 0.7791 \frac{\Delta D}{D}, \\ & (-0.2002) \quad (0.8390) \end{aligned} \quad (4b)$$

$$R^2 = 0.7110, \quad \text{adj. } R^2 = 0.6308, \quad \text{SER} = 24.665.$$

The coefficients for the real wage rate and the domestic employment are not significant; besides, a rise in domestic employment should have been negatively related to the growth of the foreign labour force.⁸

Next, consistent with our emphasis that the German immigration system implies a 'demand-determined' quota model, we could find no regressions that established a relationship between our dependent variable (or any variations therein) and the differential between the German wages and wages in the source countries of *gastarbeiter* origin. Moreover, we had been originally prepared to find, instead of the positive relationship between change in degree of protection and change in the growth of foreign labour force, a negative relationship as suggested by the hypothesis of Bhagwati (1982) and Sapir (1983) that the German government may have been more willing to let industries suffering from reduced tariff protection (under policy-dictated tariff changes as in the Kennedy Round) import more labour. Evidently, however, the government was *not* playing such a constraining role. As already indicated, the firm's decision to import labour was more or less a sufficient determinant of *gastarbeiter* inflow during the decade of our analysis, and this implied a positive, rather than a negative, relationship between the two variables.⁹

⁸From a theoretical perspective, our demand-determined model suggests also that differential changes in productivity could affect the demand for all, and hence for foreign, labour. Unfortunately, we do not have the necessary estimates of total productivity change to test for this added variable's possible impact. If the variable does matter, its omission from our estimates will create bias in the estimated coefficients. However, we may argue that only the coefficient of the change in output will be biased since we hypothesise that the change in employment of foreign workers is negatively related to productivity increase and since the change in output is the only variable in eqs. (1) and (2) which is related (positively) to productivity. Furthermore, it follows that if we had indeed been able to manage to include the omitted variable in the regression equations, the coefficients for the change in output would have been only larger, thus merely reinforcing our findings.

⁹It has been suggested to us by Andrew Sapir that labour-intensive industries, exposed to external competition, could be getting both more protection *and* be importing more foreign labour. One key element of this hypothesis, however, is empirically refuted. Thus, we can find no significant relationship between labour-intensity in an industry and change in the degree of its nominal and effective protection; the regression results can be obtained from the authors on request.

4. Source composition of gastarbeiter inflow

Next, we analyzed the source composition of workers from five principal supplying countries: Turkey, Italy, Greece, Spain and Portugal.¹⁰ Again, the data for 24 sectors (excluding numbers 54–58) were analyzed as in eqs. (1) and (2) above. The hypothesis tested successfully was the following.

The precise variable chosen as the left-hand side variable in eq. (5), which was estimated, was θ_d , which was the deviation from the mean (0.2) of the share of the incremental inflow of workers from each of the five source countries during the period 1964–1965 to 1971–1972.¹¹ Three right-hand side explanatory variables were explored: (i) θ_i , the deviation from the mean (0.2) of the share of workers from each country in the base year 1964–1965; (ii) θ_p , the deviation from the mean (0.2) of the share of the growth rate of population (as a proxy for the labour force) of each source country during the period 1964–1965 to 1971–1972; and (iii) θ_w , the deviation from the mean of the wage rate in each country in 1971 (since we could not get reliable data for 1964).¹² After numerous trials, the best fit was yielded by the following equation:¹³

$$\theta_d = (0.8451 \theta_p - 1.3161 \theta_w, \\ (5.6035) \quad (-3.7739) \quad (5)$$

$$\text{SER} = 0.2456.$$

The negative relationship between θ_w and θ_d , on the one hand, and the positive relationship between θ_p and θ_d , on the other hand, can be interpreted as indicating that where the relative wage is lower and the incremental size of the work-force is larger in a source country, the potential pool of applicants available to recruiters of *gastarbeiters* will be higher and hence recruitment is likely to produce a better, more productive worker for the same (German) wage. However, confronted with the results of many trials, we had to discard the hypothesis that initial shares had any significant effect,

¹⁰The data for Yugoslavia are not available for the early 1970s, so it had to be excluded from the analysis.

¹¹The deviations are altogether 96 in number since there are 24 sectors and five sources (of which one has to be dropped since it is not independent as the sum of all deviations must total to zero).

¹²The wage data utilised were, therefore, the recorded average wage payments in *each* industry within each source country (e.g., Turkey) rather than identical (average) wages in that source country. This procedure implies, of course, that *gastarbeiters* are more likely to move internationally within the same industry: an assumption that may definitely make sense in a 'recruitment' model of immigration as in the present case.

¹³Estimated with a constant term, eq. (6) yielded a coefficient which was not significant and hence eqs. (6) was re-estimated, dropping the constant term. Of course, all variables in the equation are in the deviation-from-the-mean form so that the summation (over all five source countries) of each variable is equal to zero and hence we should theoretically also expect the constant term to be insignificant.

positive or negative, on the source composition of *gastarbeiters*.¹⁴ We should have liked to probe this further, at the firm level; but presently the *gastarbeiter* data are simply not available at that level.¹⁵ At the present level of aggregation, however, this absence of any significant relationship between θ_i and θ_d does suggest a difference from the results for some free-immigration (rural-urban, internal migration) studies that indicate that initial migrant stocks from a source are positively related to new inflows owing to information networks.

Finally, we may remark that there is no inconsistency in principle between our findings that wage differences do not significantly influence the inter-industrial *gastarbeiter* pattern whereas they do affect the source composition. Presumably, these are not substantial enough to make a difference in the former case and are swamped wholly by the direct demand factors such as rate of growth of output or change in protection, whereas they are substantial enough to affect the recruitment pool and thus get reflected in the statistical results for the latter case.

5. Concluding observations

Our results suggest strongly that the econometric analysis of international immigration (quota) systems must reflect the institutional features that characterize them. These features vary, not merely across countries (e.g., the USA and W. Germany) but also, as in the German case before and after 1972–1973, within a country at different points of time. Again, this implies possible *differences* from the results expected and observed for the free-immigration studies relating to internal migration within countries, though the specific features of the quota-systems operated by international-immigration authorities can equally generate some *similarities* (as in section 4 above).

¹⁴It may be mentioned that, since 1968, Italian workers could come in freely under the EEC rules. However, it is widely believed that the bulk of the Italian inflow into Germany continued to take place subject to a job being first offered in Germany.

¹⁵The importance of the further probing may be seen from one example. Assume that, in a 2-firm industry, one firm (randomly) hires Turks initially and the other hires Greeks. Let the 'Turkish firm' be bigger than the 'Greek firm'. Now, let each firm hire more of the same, for reasons spelled out in the text. So, the Greek firm hires and more Greeks and the Turkish firm hires more Turks. But add now the assumption that all firms are on an expansion path which decelerates over time. Then, in a 2-period model, the faster growth of the smaller Greek firm will suffice to lead to *converging* shares at the industry level in source-composition of *gastarbeiters*! Thus, at a (firm or plant) micro-level, the recruitment model may be working exactly like the free-immigration model but the industry-level data may suggest the opposite! Evidently, we must await micro-level data to test for this.

References

- Bhagwati, J.N., 1964, The pure theory of international trade: A survey, *Economic Journal*, March, reprinted in: R. Feenstra, ed., *International factor mobility: Essays in international economic theory*, Vol. 2 (MIT Press, Cambridge, MA) ch. 59.
- Bhagwati, J.N., 1979, The economic analysis of international migration, Plenary lecture delivered to Nordisk Migrasjonsforskerseminar, Nordic Council of Ministers, Oslo, Norway, in: R. Feenstra, ed., *International factor mobility: Essays in international economic theory*, Vol. 2 (MIT Press, Cambridge, MA).
- Bhagwati, J.N., 1982, Shifting comparative advantage, protectionist demands, and policy response, in: J.N. Bhagwati, ed., *Import competition and response* (MIT Press, Cambridge, MA) 153–195.
- Kenen, P.B., 1965, Nature, capital and trade, *Journal of Political Economy* 73, no. 5, 437–460.
- Krugman, P. and J.N. Bhagwati, 1976, The decision to migrate, in: J.N. Bhagwati, ed., *The brain drain and taxation* (North-Holland, Amsterdam) 31–51.
- Mehrlaender, U., 1979, Federal Republic of Germany, in: D. Kubal, U. Mehrlaender and E. Gehmacher, eds., *The politics of migration policies* (Center for Migration Studies, New York) 145–162.
- Mehrlaender, U., 1980, The 'human resource' problems in Europe: Migrant labor in the Federal Republic of Germany, in: U. Ra'anan, ed., *Ethnic resurgence in modern democratic states* (Pergamon, New York) 77–100.
- Sapir, A., 1983, Foreign competition, immigration and structural adjustment, *Journal of International Economics* XIII.