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ABSTRACT

The extension of the 1989 Institute of Employment Research (IAB)/Prognos projection of the sectoral and job-specific labor force demand by levels of qualification shows that the previous trends toward higher qualification requirements of jobs is expected to continue in Germany. The main reasons are the significant shift in favor of secondary service jobs and the rising qualification requirements of all jobs. The expectation is that the demand for workers without a formal training certificate (unskilled workers) will continue to decline, from 23 percent (1987) to about 13 percent in 2010. Job gains are forecast for workers who complete on-the-job or school training. For this level, employment gains in service activities and losses in production jobs will balance each other. Despite an absolute increase in jobs, their share in total employment will stagnate just under 60 percent. Persons in this group who have completed further training at trade and technical schools will be more in demand, with jobs increasing from 8 percent in 1987 to approximately 10 percent in 2010. The same is true for higher education graduates. In 2010, around 18 percent of all jobs could require training at universities or polytechnics. The current view is that the shift from the former German Democratic Republic to the Federal Republic is not expected to bring about a change in the direction of these basic trends, which are being observed in most industrialized countries. (YLB)

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Manpower Requirement By Levels Of Qualification In West Germany Until 2010

Implications of the 1989 IAB/Prognos projection for the qualification structure of jobs

- Socio-economic change and job activities
- Qualification requirements until 2010
- Implications for policy and individual choice

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Manfred Tessaring*)

MANPOWER REQUIREMENT BY LEVELS OF QUALIFICATION IN WEST GERMANY UNTIL 2010
Implications of the 1989 IAB/Prognos projection for the qualification structure of jobs

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0 Abstract

The extension of the 1989 IAB/PROGNOS projection of the sectoral and job-specific labour force demand by levels of qualification shows that the previous trends towards higher qualification requirements of jobs is expected to continue. The main reasons are the significant shift in favour of secondary service jobs and the rising qualification requirement of all jobs.

Hence it can be expected that the demand for workers without a formal training certificate (unskilled workers) will continue to decline, from 23% (1987) to about 13% in 2010. Job gains are forecast for workers with a completed in-plant or school training. For this level, employment gains in service activities and losses in production jobs will balance each other: Despite an absolute increase in jobs their share in total employment will stagnate just under 60%. Persons of this group who have completed a further training at trade and technical schools will be more in demand, with jobs increasing from 8% in 1987 to approximately 10% in 2010. The same is true for higher education graduates. In 2010 around 18% of all jobs could require a completed training at universities or "Fachhochschulen" (similar to former Polytechnics) (1987: 11%).

The current view holds that the accession of the former GDR to the Federal Republic of Germany is not expected to bring about a structural break in the direction of these basic trends, which are being observed in most industrialized countries. The structure of qualification in the former GDR is rather similar to that in Western Germany. The duration of the transition process, however, is not yet predictable.

The conclusions drawn from earlier projections will probably remain valid: The trend to an increasing demand for qualified manpower requires a growing skill potential in the population: a qualified initial training, as well as a further training and higher education. However, an indiscriminate transfer of these global projections onto individual training and occupational decisions must be warned against: Individual factors play a much more important role in the decision process. Forecasts should, therefore, be considered only as a subordinate component within the complex process of individual choice.

1. Background

Forecasting the qualification requirements of jobs requires an answer to the question whether changes observed in the past are due to structural ruptures or reflect long-term trends more or less valid for industrialized countries.

As long-term trends on the supply side of the labour market can be identified (among others): increasing participation in education and training as well as a growing female labour force participation[1]; demographic swings and their consequences for the number of pupils, apprentices and students[2]; the free movement of labour in the process of European integration[3]; the aging of population in the FRG as well as in other countries.

As secular processes on the demand side the use of new technologies, changes in the organisation of work, the growth of the service sectors and the informatization of the society will have serious consequences for job numbers and job requirements, too.

International competition, environment and energy problems will require the use of new technologies and a higher productivity of labour as well. New trends in the division of labour (e.g. lean production) and the growing prosperity for the population both encourage the tertiarisation of the economy and of jobs. The increasing complexity and flexibility of the social and economic processes require new and higher skills, not only in working life.

And finally, out of all hypotheses concerning the future structure of qualifications[4], that of generally rising skills – both of the population (supply side) and of job requirements –appears to have turned out to be true.

However, recent and ongoing disturbances in Eastern and Southern Europe and the German unification are events whose consequences could not and cannot yet be calculated by forecasters. The question of whether and to what extent they will

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[1] On the development of the education and training behaviour as well as on the demographic components of educational expansion, cf. Tessaring et al. (1992); Rodax (ed.) 1989; Helberger, Palamidis 1990; Kau, Palamidis, Weisshuhn 1990; Windolf 1990

[2] cf. Tessaring et al. (1992) for the various fields of education and for a projection of demographic developments until 2020

[3] cf. Werner, Walwei (1992)

[4] .For qualification hypotheses and for critical reflections of the projections using the manpower requirement and the social demand approaches cf. inter alia: Widmaier 1971; Mertens 1971; Kühlewind, Tessaring 1975; Tessaring 1982

cause a structural break in the socio-economic development cannot be answered sufficiently at present. The duration and the circumstances of the transition of Eastern European countries to democratic societies and free-market economies remain unforeseeable[5].

Thus, such projections (including those of the Institute of Employment Research – IAB –) are conditional, optional and should therefore be interpreted in the subjunctive form. They are conditional because they have to make assumptions about future conditions. The degree to which these assumptions prove to be realistic determines how far the forecasts deviate from later reality. They are optional because they show several alternatives for policy action and thus explicitly try to avoid any determinism.

2. The IAB/PROGNOS projection 1989: Manpower requirement by sectors and job activities

In 1989/90 the IAB elaborated its second long-term projection of the future manpower demand by economic sectors and job activities[6]. This projection was extended by levels of qualification in 1991 [7]; earlier forecasts had been published in 1985/86 [8]. The 1989/90 projection covers the period up to the year 2010 and calculates several scenarios of future economic and technological developments. However, since the supporting time-series of the past were only available up to 1987 at that time, it was neither possible to include the Eastern German territory (former GDR) nor to calculate the effects of the unification.

The basic assumptions and findings of the 1989 IAB/Prognos projection are summarized in Table 1 [9].

The projection of the sectoral structure of jobs confirms the continuing growth of the service sectors. Until the year 2010 and according to all growth variants, al-

[5] For the labour market problems in a unified Germany cf. Klauder, Kühlewind 1990; on the possible effects of the Single European Market of the extent and structure (with regard to qualification as well) of the labour force cf. inter alia Prognos et al 1990; Buttler, Werner, Walwei (eds.) 1990; Vogler-Ludwig 1990

[6] The term "job activity" (not equivalent to occupation) is a specific German definition of work contents and tasks performed in a job; job activities are additionally asked for in the German labour force surveys (microcensuses; 1% samples of all households). They contain activities e.g. of construction, transport, clerical work, research and development, executive/managerial functions and so on.

[7] Levels of qualification are, according to German statistics, defined here as the highest certificated degree of formal education and training (e.g. apprenticeship training, higher education).

[8] cf. Prognos et al. (1985); (1986)

[9] For the projection method and the detailed findings cf: Prognos et al. 1989

*Table 1. Basic results of the IAB/Prognos projection 1989**

(A) ECONOMIC DEVELOPMENT (1987-2010, % p.a.)

	lower variant	medium variant	upper variant
economic growth	1.5	2.3	2.7
labour productivity	1.6	2.1	2.4
working time	-0.8	-0.7	-0.8

(B) LABOUR FORCE DEMAND (upper growth variant, cf. A)

	1987	2010	change '87-'10	structure 1987	structure 2010
	million jobs			%	
total	**27.0**	**29.0**	**2.0**	**100.0**	**100.0**
a) by economic sectors					
primary sector	1.0	0.7	-0.4	3.7	2.4
secondary sector	10.6	9.3	-1.3	39.3	32.1
tertiary sector	15.4	19.1	4.2	57.0	65.9
b) by fields of job activity					
production-related activities	**9.0**	**7.8**	**-1.1**	**33.3**	**26.9**
- extraction, processing	*5.2*	*3.4*	*-1.8*	*19.3*	*11.7*
- machine operating/control	*2.2*	*3.1*	*0.9*	*8.1*	*10.7*
- repairing, restoring	*1.6*	*1.3*	*-0.2*	*5.9*	*4.5*
primary service activities	**9.8**	**9.0**	**-0.8**	**36.3**	**31.0**
- general services	*2.9*	*2.8*	*-0.1*	*10.7*	*9.7*
- trading, selling	*2.7*	*2.9*	*0.3*	*10.0*	*10.0*
- clerical work	*4.2*	*3.3*	*-0.9*	*15.6*	*11.4*
secondary service activities	**6.7**	**10.9**	**4.2**	**24.8**	**37.6**
- R&D. planning/constructing	*1.3*	*2.0*	*0.8*	*4.8*	*6.9*
- management, organisation	*1.5*	*2.7*	*1.2*	*5.6*	*9.3*
- security, law	*1.1*	*1.5*	*0.4*	*4.1*	*5.2*
- social svce/training/information	*2.8*	*4.6*	*1.8*	*10.4*	*15.9*
apprentices**	**1.6**	**1.3**	**-0.3**	**5.7**	**4.5**

*) without the territory of the former GDR
**) in employment statistics apprentices are defined as workers
Source: Prognos AG et al. (1989)

most two thirds of all jobs will be found in the tertiary sector; in 1970 their share just was 43%. Correspondingly, employment in the primary and secondary sectors will be reduced remarkably. This decrease, however, could be more than compensated for by the employment gains of the tertiary sector.

Based upon the sectoral projection, the IAB/Prognos forecast was extended to the question of how job activities (work tasks) would be affected by those develop-

ments. For an interpretation of the results, two effects have to be distinguished: On the one hand, the growth of the service sectors which reinforces the shift towards service activities. On the other hand a growing share of service functions will be found within the production sectors, too, even if employment opportunities here are shrinking in absolute figures.

The projection of job activities explicitly included effects which proceed from different technologies and socio-economic changes. Analyses of various technology studies and expert ratings were undertaken to identify changes of specific job contents and their implications for future employment opportunities.

Similar to the sectoral forecast, the breakdown by job activities results in a declining significance of those activities closely related to production. An exception here are functions of "setting, operating, and monitoring machines or plants": the modernization of the production equipment, the use of new technologies, and the increasing complexity and flexibility of manufacturing processes will bring those tasks into the foreground.

The field of less human capital intensive primary service activities, which are focused mainly on pre-and post-production activities (e.g. clerical work, sales, transport etc.) or which serve directly for consumption (e.g. cleaning, hairdressing, lodging, waiting) also have declining or stagnating shares. Within this job category, however, a persisting shift in favour of specialist functions with higher skill requirements can be expected.

Unlike production and primary service jobs, the secondary service activities are expected to increase substantially both in absolute and relative figures. Secondary service tasks are characterized by a high level of human capital intensity and serve "to improve ... production qualitatively via the increased promotion and utilization of the human mind."[10] In particular, these are tasks concerning organization, operation, coordination and management work, jobs in research and development, planning and construction as well as tasks related to medical and social care, counseling, training, information and communication.

[10] Klauder (1990b), p. 141

3. Manpower requirement by levels of qualification until 2010

In 1990/91 the IAB/Prognos projection of 1989 was extended by the qualification structure of jobs. The aim of this additional breakdown was to illustrate the possible implications of structural changes of jobs (activities) for the qualification requirement. Qualification is defined as the highest formal level of training as provided and certified by education and training institutions. Informal further training (e.g. internal enterprise training measures or on-the-job training) could not be taken into consideration due to the lack of data and problems of comparability.

The supporting period for the qualification forecast were the years 1976–1987; data on activities and qualification structures in the past are based on the labour force surveys (micro censuses), and the absolute overall employment figures on the National Accounts.

3.1 Definitions and methodological procedure

The projection of the qualification forecast, based on the 1989 IAB/Prognos activity-forecast has been aggregated to 10 main categories of job activities.

Five levels of formal qualification were distinguished in the projection:

1) without completed formal training (unskilled) [NFQ]
2) completed apprenticeship training or in-school vocational training ("Lehre/Berufsfachschule") – (initial training) – [BL/BFS]
3) completed further training at trade and technical schools ("Fachschulen") incl. health schools and schools for master craftsmen [FS]
4) completed non-university higher education ("Fachhochschulen") – [FH]
5) completed university higher education including colleges of art and music, theological and teacher training institutions ("Wissenschaftliche Hochschulen") – [UNI]

The qualification forecast was – in each of the three growth variants (cf. Table 1) – carried out for several sub-variants (status quo, global trend, trends specific to job activities). In the following presentation of the projection results, the upper growth variant and those variants calculating the structural trends of qualification

by each job activity are put into the foreground. A technical note: these variants are based on exponential trend functions with limiting values concerning the share of each level of qualification within each job activity[11].

It should be remarked however, that the projection results can and should only trace the basic tendencies and magnitudes of the future qualification requirement. A regular evaluation of the projections and, if necessary, a new modeling are therefore necessary – in particular when the basic data for the new German states (former GDR) are available.

3.2 The qualification demand in different fields of job activities

The qualification structure of the whole labour force was in the past characterized by a shift towards medium and higher qualification levels to the disadvantage of unskilled workers. In 1976 the share of employed persons without completed vocational training (NFQ) totaled 35%, in 1987 23%. The share of highly qualified manpower (FH, UNI) out of the total labour force increased from 7% to 11%, and the medium levels of qualification (BL/BFS; main group: with completed apprenticeship training) from 51% to 58%. Another 6.5% in 1976 and almost 8% in 1987 had completed training at trade/technical schools (FS).

The following results will be discussed for three aggregated main fields of activity ("production related", "primary service" and "secondary service activities").

3.2.1 Qualification requirement in production-related activities

According to the 1989 forecast of job activities by IAB/Prognos, the number of production-related jobs will be reduced between 1987 and 2010 by more than 1.1 million or 12% – in spite of the increase in the total labour demand (+8%). The share of production activities of the total jobs available thus would fall from 35% to 28%.

Most affected by this trend are activities related to mining/extracting, manufacturing and processing as well as to repair and restauration work. IAB/Prognos expect a substantial decrease in the number of these jobs in the pe-

[11] For details cf. Tessaring 1991

riod 1987–2010. Above all this reduction concerns ancillary, unskilled jobs; higher qualified jobs are less affected. In particular, workers without completed training and with apprenticeship training only will face the highest job losses.

Unlike the production activities mentioned before, jobs related to controlling, operating and actuating machines and plant will increase in numbers. The growing spread of integrating and high-tech (particularly flexible) manufacturing systems in production will substantially reduce manual work with hand-tools and manually controlled machines. This work will be replaced more and more by functions concerned with preparing, operating and monitoring flexible production assemblies. In the past, skilled workers (BL/BFS, FS) performed the majority of these jobs (almost 2/3). Unskilled workers were represented by 1/4 and graduates from higher education by around 10%.

The results of the qualification forecast indicate that all levels should profit from the increase in machine operating jobs, although to a different extent. While unskilled jobs will increase very slightly and the job growth for apprenticeship trained manpower will be below average, the demand for persons with a completed training at trade and technical schools should augment above average. The growing complexity and importance of highly technical machinery for the operation of a factory requires more and more comprehensive and flexible skills. These "responsible" jobs are increasingly entrusted to workers who have supplemented their initial training (e.g. apprenticeship training) in further training programmes.

Altogether, production-related activities thus show divergent developments in the period 1987–2010: job losses in the areas of primary production and repair work on the one hand, job gains in machine and plant operating work on the other. However, the latter job growth will only partly offset the decrease in the first two fields.

Aggregating the three types of production activities by levels of qualification, the demand for unskilled workers (NFQ) will decrease significantly (by –1.2 million or –44% on the average) and the demand for apprenticeship trained persons (BL/BFS) slightly (by around –50,000 or –1%) over the period 1987–2010.

Despite the overall decrease in production jobs, the growing qualification re-

quirements result in an increasing demand for FS-graduates and higher education graduates (FH, UNI) by 15% or 34% on the average (Table 2).

3.2.2 Qualification requirement in primary service activities

The expected growth of service related jobs does not apply to all service jobs equally. For the primary service activities, i.e. those with a relatively lower level of human capital intensity, decreasing demand figures are expected by IAB/Prognos (–773,000 or 8% over the period 1987–2010). A closer analysis reveals a certain ambivalence in future trends.

In the field of general service activities (such as accommodation, waiting, cleaning, transporting) and of commercial and clerical/assistant work continuing rationalizations are expected to reduce the number of jobs, especially those with lower skill requirements. On the other hand, increasing specialization, counseling activities, and internal reorganizations of work will favour higher skilled jobs to the disadvantage of less skilled assistant work. These jobs will be enlarged by executive elements with a growing application of integrated information and communication technologies.

As a consequence, jobs for unskilled workers (NFQ) would drop by 40–50% or more than 1 million during the period 1987–2010. For the BL/BFS-level the projection indicates more or less a stagnating demand as compared to 1987.

While demand figures for the FS-level will just grow slightly by approximately 14% (+63,000 on the average), the increase in the demand for higher education graduates (FH, UNI) is more significant: over the projection period they could gain in employment by more than 40%. This corresponds to more than 150.000 to 200.000 additional jobs within the projection period (Table 3).

3.2.3 Qualification requirements in secondary service activities

The overall increase in manpower demand is mainly originated – as in the past – by secondary service activities. They are characterized by a high intensity of human capital and a greater distance to real production than was the case for primary services. Secondary service jobs include research & development/planning, public

Table 2 Manpower requirement in production-related activities * (1,000)

	Unskilled (NFQ)		Apprenticeship/ vocational training		Trade and technical schools		Non-university tertiary education		University graduates		Total
Year	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	
1976	4161.2		4760.2		545.4		40.7		27.2		9535.2
1987	2738.8		5395.0		694.5		80.0		49.8		8956.1
2000	2029.5	1873.5	5489.8	5532.2	737.3	824.1	99.7	112.3	48.8	63.0	8405.1
2010	1585.8	1458.7	5359.7	5332.8	734.9	860.1	110.5	119.4	48.3	68.3	7839.3
'10-'87	-1153.0	-1280.1	-33.3	- 60.2	40.4	165.6	30.5	39.4	- 1.5	18.5	-1116.6

* Notes and source cf. table 1) without apprentices or the former GDR. Upper growth variant, qualification projection specific to job activities (trend variants TR1 and TR2). Source: Tessaring 1991

Table 3 Manpower requirement in primary service activities * (1,000)

	Unskilled (NFQ)		Apprenticeship/ vocational training		Trade and technical schools		Non-university tertiary education		University graduates		Total
Year	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	
1976	3206.6		5332.3		402.2		129.2		116.7		9187.0
1987	2396.1		6459.0		462.2		231.1		209.8		9758.2
2000	1807.4	1713,5	6548.2	6608.0	487.6	493.2	269.8	274.0	260.8	285.2	9373.8
2010	1448.3	1194.4	6444.5	6580.5	498.2	552.1	301.6	314.9	292.7	343.5	8985.3
'10-'87	-947.8	-1201.7	- 14.5	-121.5	36.0	89.9	70.5	83.8	82.9	133.7	-772.9

Notes and source cf Table 2

security and safety, application of the law, management, organization and executive tasks as well as activities in the broad area of care, counseling, teaching/training and information. IAB/Prognos estimate an overall increase in these jobs by more than 60% (almost +4.2 million) over the period 1987–2010.

Within the field of secondary services, the rapid technological change and growing competition will force enterprises to intensify their research, planning, and development activities. Favoured are qualified assistant jobs with practical functions (FS–level and FH–level) more than those with pure research assignments (UNI) – which have already at present a high share of R&D jobs.

Decentralization of enterprise structures, a growing differentiation of executive work and new structures of work organization (e.g. lean management) will lead to an extension of management and organization activities. This does not necessarily the growth of purely executive functions in a traditional sense, but – via processes of job enlargement and job enrichment – a decline in routine work within all company departments in favour of jobs with a broader and more integrated spectrum of functions. IAB/Prognos assume that the growing complexity and internationalization of markets will require increasing planning, operational and coordination tasks. On the whole, management jobs in this definition could increase by a total of 80% until 2010.

The majority of employees concerned with organization and management functions possess at least medium–level qualifications. The demand growth will, therefore, benefit above all those who have completed trade and technical schools (FS–level) and higher education graduates (FH, UNI). According to the trend–variants, the share of FS–trained personnel could more than double until 2010. The same is true for FH–graduates (+109%) and even more for UNI–graduates (+146%).

However, the highest demand increase among all fields of activity is expected for those tasks which are related to counseling, care, training and information. About 1.8 million additional employment opportunities could be opened up here over the period 1987–2010. The highest increase is expected for counseling, care and information jobs, whereas training jobs will be less favoured. Within the training activities, those related to in–plant or external further training will grow more

than traditional school education and training jobs (due to the decrease in the number of pupils).

The expected expansion of all secondary service activities over the period 1987–2010 will benefit all qualification levels, though some distinctions must be made: growth rates below average or even decreasing numbers (according to the variants calculated) are calculated for jobs open to unskilled persons (NFQ); an average demand growth is expected for BL/BFS–trained manpower (+ 1,35 million or +47%). An increase above average is projected for those who have completed training at trade and technical schools (FS); here the number of available jobs could grow by 765,000 (+93%). The future number of jobs available in the secondary service activities for persons with completed higher education (FH, UNI) could increase by more than 2 million or 92% (Table 4).

4. Overall future labour demand by levels of qualification

Aggregating the structural changes of labour demand by fields of activity and qualifications discussed above, two basic trends take shape. On the one hand, there is a continuing shift of jobs from production–related and primary service tasks to secondary service activities. This is due to the activity effect of future manpower demand. On the other hand, the projection shows increasing qualification requirements in all activities – even in those with shrinking job figures (qualification effect). With regard to their direction and magnitudes these structural changes turn out to be relatively stable for all trend variants calculated.

4.1 The demand for unskilled labour (NFQ)

The discussed changes in the job structures by sectors and activities will lead to an overall decreasing demand for persons without completed vocational training. The future demand for unskilled workers will continue to decline as it did in the past (from 8.55 million in 1976 to 5.91 million in 1987); by the year 2010 only 3.6 – 3.7 million jobs for unskilled workers are expected to remain. This represents job losses of about 2.3 million or 40% over the period 1987–2010. The share of unskilled manpower within the total labour force would thus decrease from 35% in 1976, to over 23% in 1987, and to around 13% in 2010.

Table 4. Manpower requirement in secondary service activities * (1,000)

	Unskilled (NFQ)		Apprenticeship/ vocational training		Trade and technical schools		Non-university tertiary education		University graduates		Total
Year	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	TR1	TR2	
1976	1181.7		2511.2		652.3		368.7		1112.2		5826.1
1987	769.9		2899.4		826.4		668.5		1535.4		6699.3
2000	789.3	941.7	4072.1	3778.4	1309.4	1394.5	1142.6	1183.6	2407.6	2422.8	9721.0
2010	699.5	925.5	4445.7	4049.9	1525.7	1656.5	1384.8	1452.6	2830.9	2802.3	10886.6
'10-'87	-70.1	155.9	1546.3	1150.5	699.3	830.1	716.3	784.1	1295.5	1266.9	4187.3

* Notes and source cf Table 2

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The rapidly declining demand for unskilled labour will be induced above all by the reduction of jobs in production-related activities. This alone accounts for almost half of the total job losses for the unskilled. In addition, higher qualification requirements in all activities – in those declining as well as in those increasing – will lead to an additional acceleration of the job losses for the unskilled.

4.2 The demand for persons with completed apprenticeship or vocational school training (BL/BFS)

The future development of the demand for apprenticeship and vocational school trained labour does not indicate a uniform pattern . The projection results, balanced out over all particular activities, show absolute employment gains, but an overall stagnating share of the future total labour force demand.

The reason is that the growth in employment for BL/BFS-trained persons in the secondary service activities will largely be compensated for by declining numbers of jobs in most production and primary service activities. Since BL/BFS-workers are highly concentrated in these areas, the activity effect will have serious consequences for their future employment opportunities, as well. Nor will the upward trend of the qualification requirements lead to an above average growth in the employment of skilled workers.

The result of these divergent developments is that the relative increase in the demand for BL/BFS-level will probably not exceed the overall job growth (9%). The share of this qualification level among total employment will remain relatively constant (just around 60%). This does not mean absolute job losses, however, but an absolute increase by about 1.2 to 1.5 million jobs until 2010.

4.3 The demand for manpower with completed training at trade and technical schools (FS)

For all categories of higher qualified manpower the increases in demand turn out to be above average. Changes in the structure of job activities and increasing skill requirements develop in parallel.

This also applies to the demand for graduates of trade and technical schools

(which are mainly further training institutions requiring a completed initial training; FS-level). The reason seems plausible that in many areas of work tasks – especially those with a high responsibility for the operation of a factory, e.g. flexible production assemblies – former jobs requiring only apprenticeship or vocational school training will be substituted more and more by persons who have acquired a further training.

The jobs available for this group are expected to grow by 830,000-1.1 million in the period 1987-2010. By the year 2010 the total demand for FS-trained persons would range between 2.8-3.1 million, 39%-55% more than in 1987. A good 10% of all jobs would then require a FS-training level.

4.4 The demand for higher education graduates

From employment gains, in particular in the field of secondary service activities, and from overall increasing skill requirements of jobs, graduates with completed non-university type higher education ("Fachhochschulen"; FH) will benefit above average.

The aggregated projection results indicate (according to the variants calculated) a continuing demand growth, by 820,000-900,000 up to the year 2010. The total number of jobs for FH-graduates could almost double in the period 1987 to 2010 to 1.8 – 1.9 million. In 2010, around 7% of all jobs will require a qualification on the FH-level.

The demand for graduates with completed university type higher education (UNI) could increase by almost the same degree as for FH-graduates. A look back into the recent past reveals that there has been an above-average job increase at the UNI-level: Between 1976 and 1987 employment of university trained manpower rose from just 1.3 to 1.8 million, and their share in total employment from 5% to 7%.

University graduates are found mainly in the fields of secondary service activities (1976: 86%) and only to a small extent in the primary services and in production activities. The growth of secondary services combined with rising skill requirements in all activities will mean a double benefit for these graduates. Between

1987 and 2010 the number of jobs available for them will increase by more than 1.4 million on the average. The overall demand for university graduates in 2010 will total around 3.2 million, almost 80% more than in 1987. This means that, in 2010, 11–12% of all employment opportunities would be available for university graduates.

Adding up the projection figures for the two higher education levels (FH+UNI), a rising demand for highly qualified manpower can be expected. The increase results in 2.2 to 2.3 million additional academic jobs between 1987 and 2010, 80% more as compared to 1987 (2.7 million). Total employment of graduate labour would then amount to about 5.0 to 5.1 million jobs by the year 2010, representing 17% to 18% of total employment (Table 5).

5. Concluding remarks

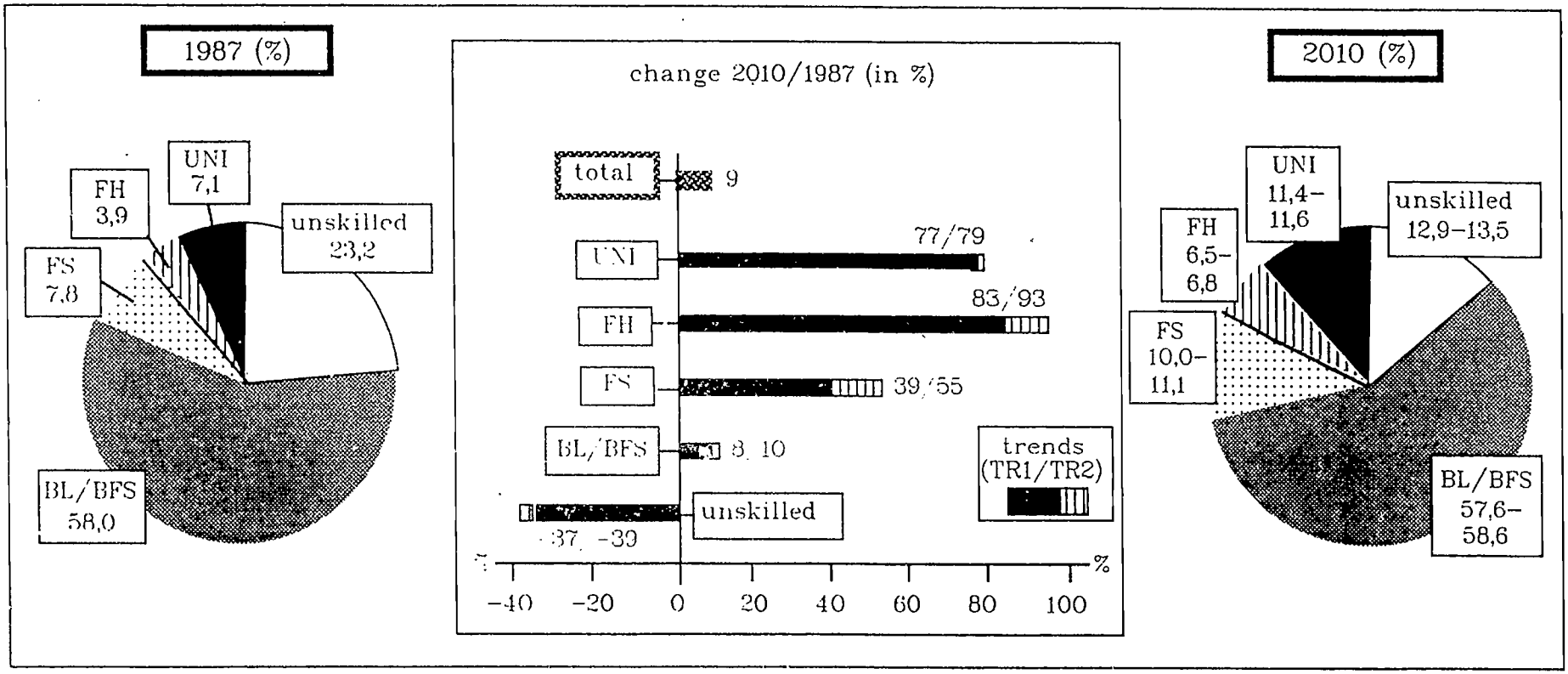
As mentioned at the beginning, the results of the projection of qualification requirements reflect only basic trends in future development. In the face of numerous imponderables affecting the future economic and social framework as well as specific demand attitudes of the employers they can only give a more or less rough impression of the spectrum and structural changes of the future.

It should, however, be pointed out that the IAB/Prognos projections are not only based on rather varied data sources; in addition, a variety of influencing factors were taken into consideration and forecast across a relatively wide range by calculating several variants. By the way, similar results (at least for highly qualified manpower) can be found in projections carried out by other institutes in the past years [12].

In spite of this, every long-term projection does of course run behind reality: the time lag from the last base year, for the availability of data and the calculations is in general at least 2–3 years. A good example of unforeseeable events was the unification of Germany in 1990.

[12] cf. the projection for higher education graduates by Siebert, Schmid 1988; by qualifications: Weisshuhn, König 1989; a similar projection for Austria has been carried out by the "Beirat für Wirtschafts- und Sozialfragen 1989"; projections of the demand and supply of manpower by levels of qualification are under work by the Federal-State Committee of Educational Planning and Research Promotion (BLK) [results are expected in 1993]

Table 5 Manpower demand by levels of qualifications in the GDR up to 2010



*) Without apprentices; trend variants of qualification projection specific to job activities (TR1, TR2; upper growth variant; excluding the territory of the former GDR
BL/BFS: completed apprenticeship or vocational training; FS: completed training at trade and technical schools (Fachschulen); FH: completed training at non-university higher education (Fachhochschulen); UNI: completed university training
Source: Tessaring (1991) /prognos/

A serious limitation to structured manpower requirement projections is the implicit assumption of a functional correspondence between "stocks" of and "demand" for manpower in the base period.

Several indicators concerning the adequacy of employment in the FRG demonstrate that skilled and highly skilled personnel do have substantial advantages in employment. Their position in the enterprise hierarchy is significantly higher than for lower skilled persons. Earnings show a close correlation between income level and qualification; the same applies to qualification-specific unemployment rates. It seems obvious that both young people and employers value a high qualification. Herewith, the problems of adequacy of employment are not dispelled but it seems plausible that those problems – at least for higher skilled manpower – are not as grave as to doubt generally the usefulness of projections.

Finally some remarks should be added concerning the consequences of German unification on future labour force patterns. Those consequences could not be considered in the projections presented since suitable data, time series and projections for the former GDR did not exist up to now. Apart from this, a simple addition of the employment figures in the new territory to the former West German data – even if data and projections were available – could not be justified: the nomenclatures and contents of jobs and of qualifications are too different to simply add them up.

The new German states need some time for adjustment. This need results above all from the missing competition with regard to prices and quality and the low productivity in the former GDR. Public GDR-investment policy had in particular supported those industries which in western countries had long since been forced to retrench. Thus the GDR invested a great deal more in the production of basic goods than the FRG and much less in capital and consumer goods[13].

This is also reflected in the structure of employment. On the whole the sectoral structure of the GDR labour force in 1987 corresponded to that of the FRG 1967. The findings are similar concerning the structures of job activities.

Looking at the qualification structure (at least by formal definitions) it can, how-

[13] cf. Sachverständigenrat (1990)

ever, be stated that human capital in the former GDR had achieved a high level[14]. The shares of highly qualified manpower (university level) in the two German states were quite similar (11–12%); the same applies to apprenticeship trained manpower (around 60%). The share of unskilled workers in the former GDR (10%) was even substantially lower than in the FRG (23%). We can thus conclude that the skill potential in the new German states forms a good base for future adjustments to technological and social change – despite of all differences in the skill contents and the former utilization of manpower.

An analysis and projection of the supply and demand for labour by qualifications for the united Germany must be left to the future. As the current situation (1992) shows, the process of reducing the number of jobs in the new states is running at high speed and will probably accelerate. The reasons for this process have less to do with the transition to a market economy than with previous developments in the GDR: displacement of labour in this process of adjustment and the destruction of old jobs seem to be the necessary preconditions for a successful structural change in the course of which new jobs can be created[15].

This results in considerable challenges for all areas of policy, especially for labour market measures and training policies, especially for further training, retraining, job creation and mobility incentives. From the present view it can hardly be expected, however, that the German unification will bring about a fundamental reversal of the long-term structural trends discussed above. These trends can be observed in most industrial countries.

The long-term implications of the qualification forecast for Western Germany seem to be clear. Seen from a labour market perspective, a substantial cut in the capacities of higher education and training hardly seems to be justified. The aging of the population, as well as the consequences of new technologies and social change, require a rise in the skill level of our population – the most important natural resource available. From the Single European Market as well as from the growing world-wide competition further challenges will arise. In order to compensate for the years of low birth rates and the resulting lower number of people

[14] cf. Reuschel, Hensel (1992)

[15] cf. Klauder, Kühlewind (1990)

leaving initial training in the future, further education and training for older people will be one of the most important tasks in the future.

Another important task will be to reduce the number of young people entering the labour market without any formal training. All efforts have to be made to motivate those youngsters, who have few opportunities and little incentive to complete a qualified training to make up for this deficit. To a still higher extent than today, individual career and employment opportunities will depend – among others – on the qualification level achieved. In this context, the system of education and training has to be modernized and new opportunities have to be created by enterprises and the public sector to offer workers better individual careers. This can be accomplished by supporting further training and by providing access to higher positions which until now usually require a higher training certificate.

However, macroeconomic projections should not be the sole guideline for individual education and training decisions. Projections – as understood by the IAB – are conditional, depend on the assumptions made, and furthermore are subject to numerous uncertainties and imponderables which reflect our incomplete knowledge on labour market and employment processes (e.g. flexibility). Therefore they are meant for policy makers and planners much more than for individual career guidance. It should always be kept in mind that future decisions and attitudes of the various actors in the labour market (especially when reacting on those projections) could lead to their self-destruction – which could sometimes be quite desirable (warning function of projections). Global projections can only indicate magnitudes or basic directions of future developments and thus should only be a subordinate component within the complex process of individual educational and occupational choice.

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[Abbreviations of IAB-publications (available at IAB on request):
BeitrAB: Beiträge zur Arbeitsmarkt- und Berufsforschung;
MatAB: Materialien aus der Arbeitsmarkt- und Berufsforschung;
MittAB: Mitteilungen aus der Arbeitsmarkt- und Berufsforschung]