

Skill Demand and Skill Matching in Comparative Perspective

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December 2008

1 Abstract

The project analyses individual worker-to-job matches by considering workers' and their employers' hiring decisions and wage negotiations as contingent on the structure and dynamics of the education and labor market system, i.e. skill supply and skill demand trends. Special emphasis is given to the task-approach and the patterns of upgrading and polarization in skill requirements.

The major questions are: 1) Which occupations and skills (formal, informal) can be expected to grow versus decline? 2) What are the outcomes of required, over- and under-education and job-related skills in terms of labor market success (i.e. wage, career perspective, job security, employment status etc.)? 3) Do results differ by nation states, and if, how can we explain?

The nationally representative BIBB/IAB and BIBB-/BAuA data for Germany are unique data sets at the worker-level in that they include detailed information on respondent's qualification and career history, as well as in-depth job-related information (organizational information, job tasks, job skill requirements, working conditions). Given their large sample sizes of 20,000-30,000 workers they allow for analyzing issues of skill demand change and skill matching within and between detailed industries and occupations. The project aims at using these data together with similar data from other countries, and following a collaborative comparative methodology.

2 Research question, data, and methods

Modern knowledge societies are in a sustained transformation process: globalization, demographic shifts, structural and technological change give more weight to the creation of value by knowledge industries and seem to alter the structure in the demand for skills (Rohrbach, 2007). Analyses of 20 OECD countries from 1970 to 2002 reveal that the structural change, on average, goes in hand with a decline in the association between formal education and income but with income improvements for people with high educational degrees (Rohrbach, 2008a); moreover aggregate data analyses show that inequality is fostered with rising importance of the knowledge sector controlling for globalization, demographic shifts, institutional aspects of the nation states, as well as skill supply (Rohrbach, 2008b). Not only from

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a social cohesion perspective, i.e. focusing on the integration of individuals in the labor market (successful matching), but also from the perspective of economic competitiveness (optimal resources allocation) and efficient educational planning (projecting future workplace needs) profound knowledge on the nature of modern job skill requirements is essential.

Basically, skill demand is triggered by structural change (i.e. a rise in a sector, industries, and occupations) and by changes within these aggregates. Whereas the between-occupation changes might be captured with standard survey data, the latter is largely unknown (Handel, 2008, p. 5). Partly because there are virtually no representative data on that issue (Handel, 2003; Tåhlin, 2006), the question which types of jobs skill requirements can be expected to grow versus decline is an object of controversial discussion.

Largely, there are two different views on the structure of changes in the demand for skills: upgrading and polarization. Within the theory of post-industrialism¹ but also within the skill-biased technical change (SBTC) framework it is taken for granted that the demand is monotonously rising in skills (Morris & Western, 1999; Acemoglu, 2002), i.e. there is an upgrading in skill requirements. On the contrary, some authors examining changes in job task content with data from e.g. the Dictionary of Occupational Titles conclude that through computerization it is not low-qualified labor but routine job tasks typically worked by medium qualified people that are shrinking in size (Autor, Levy, & Murnane, 2003; Autor, Katz, & Kearney, 2006). They argue that computerization replaces human labor in those jobs, be they manual or cognitive, which perform routine tasks. In contrast, technology (as yet) is complementary to non-routine job tasks which may be high-skilled as well as low-skilled. In the literature the dominant view is one of increasing requirements. However, empirical analyses on skill change are rare and there are a number of facts troubling the classical SBTC theory (Handel, 2008; DiPrete, 2007, 2005; Tåhlin, 2006). Studies for the US (Autor, Katz, & Kearney, 2006), Great Britain (Goos & Manning, 2007, Green 2006, Green & Zhu 2008) and some European countries (Goos et al. 2009) suggest that the relative demand trends for qualifications are better described as polarization than as mere enhancement (also see the work of Spitz-Oener (2006) for Germany).

However, not only the question of changes in the *level* of skills, i.e. polarization versus upgrading, but also changes in different *types* of skills and skill outcomes are of relevance when debating e.g. trends in skill matching, competitiveness, and educational planning (Handel, 2003; Korpi and Tåhlin, 2008; Felstead and Green, 2008). Specific as well as generalizable knowledge on job characteristics (such as surveillance, autonomy, employment status, employee involvement practices, employment security and flexibility, interpersonal skills, income, career perspectives, workplace organization and the like) can't be derived with standard measurement of the demand side² as well as with the reliance on case studies.

¹ In Bell's early work (Bell, 1973) there is a thesis of an occupational upgrading. Employment in the growth industries would be characterized by higher requirements in theoretical knowledge and technical expertise. These demands only could be achieved in higher education institutions by people with high cognitive abilities.

² Either skill demand is inferred from data on skill supply (education) and wages (usually in labour economics), by occupational schemas (American DOT, Erikson-Goldthorpe-class models etc.) and average or typical education among job holders (e.g. CEDEFOP 2008).

Moreover, the issue calls for a comparative perspective, i.e. nationally comparative data sets: Firstly, in as much as the prominent candidates responsible for changing demands, i.e. technological and structural change, globalization and demographic shifts are factors that might effect all modern nation states, cross-national comparisons would be especially suitable. Secondly, from comparative research in social stratification and welfare state research it is well known that individual occupational outcomes³ are contingent not only on the individuals themselves but also depend on the idiosyncratic history and context of the nation state, i.e. that advanced capitalist economies are characterized by different systems of skill creation and thus differ in their institutional arrangements governing the school-to-work nexus: With regards to their education and training systems capitalist economies at least can be differentiated by the extent of standardization, the degree of differentiation, and the role of privatization, the organization of vocational education and training (school- or work-based, or both), the extent of regulation or vocational specificity (e.g. Müller & Shavit 1998, Kerckhoff 2001). With regards to the labor market system the extent and nature of segmentation, wage-setting mechanisms, industrial relations, as well as the overall policy framework (unitary versus federal, the role of unions, de-commodification) are decisive institutional arrangements with regards to skill formation (e.g. Birkelund 2006: 335⁴). For example, research on occupational attainment shows that vocational training and certification in secondary schools smooth school-to-work transitions (e.g. Müller & Shavit 1998; Müller & Gangl, 2003; Meer 2007; Diekhoff 2008) or that the degree of matching tends to be greater in countries with a standardized system of vocational education (Raffe & Müller, see the discussion of the 'safety net' and 'diversion' effects in Shavit & Müller 2000). Thus, the question of changing skill requirements could greatly benefit from comparative perspective relying on comparative social stratification and welfare state research.

The nationally representative BIBB/IAB and BIBB-/BAuA data for Germany are unique data sets at the worker-level in that they include detailed information on respondent's qualification and career history, and in-depth job-related information (organizational information, job tasks, job skill requirements, working conditions). Given their large sample sizes of 20,000-30,000 workers they allows for analyzing issues of skill demand change and skill matching within and between detailed industries and occupations (Rohrbach 2009). The project aims at using these data together with similar data from other countries and to analyze similarities and differences in skill demand change and skill matching within and between countries. To this end, the variance in skill demand trends and matching at different levels should be considered:

- the *within-job, worker variance* as regards her sociodemographic, human capital, and workplace characteristics, and over-time job variance,
- the *between-job variance* e.g. as regards workers-to-job (mis)matches, profiles of skill / task requirements across the routine-/non-routine categories,
- the *firm - and industry variance* as regards firms' work organization, trade openness and regional shaping, and,

³ Equally, research has demonstrated a plenty of ways by which *educational* outcomes are contingent on institutional settings (for an overview see e.g. Schneider 2006, Breen & Jonsson 2005).

⁴ For an overview from social stratification literature see Hout & DiPrete, 2006; Birkelund, 2006; for reviews of the new economic sociology see e.g. Amable 2005, Jackson and Deeg, 2006.

- the *cross-national variance* given the embeddedness of the education-to-labor market nexus into different institutional settings, i.e. the social and economic models of nation states.

Moreover, within the project methodological questions concerning the national and international measurement of skills and tasks at the worker-level should be followed⁵.

Exploiting a (collaborative) comparative methodology, and by combining a case-oriented with a variable-oriented research design re-analyzing available data sets, the project aims at answering the following questions:

- Which occupations and skills (formal, informal) can be expected to grow versus decline? Is there a trend towards more occupation-specific or towards more general skills, and / or are there differences within groups of occupations? How much of total variance is due to within-occupational change? Are there links between job task categories and job matching?
- What are the outcomes of required, over- and under-education and job-related skills in terms of labor market success (i.e. wage, career perspective, job security, employment status etc.)?
- Do results differ by nation states, and if, how can we explain? How well the education, labor market, and welfare institutions do cope with changing skill requirements?

3 First outcomes

ROHRBACH, Daniela, ALDA, Holger, 2009: Marginal employment: skill requirements and competitive conditions in industries. Paper presented at *The Low Pay, Low Skill, and Low Income (LOPSI) Cross-cutting Workshop* organised by EQUALSOC Network of Excellence and LoWER Network, 26.-27. June 2009, Milan, Italy and the *European Survey Research Association (ESRA)* conference, 29. June -03. July 2009, Warsaw, Poland.

ROHRBACH, Daniela, 2009: The BIBB/IAB- and BIBB/BAuA Surveys of the Working Population on Qualification and Working Conditions in Germany. Data and methods manual. Online at URL: www.bibb-fdz.de.

ROHRBACH, Daniela, ALDA, Holger, 2009: Imputation fehlender Werte bei der Einkommensvariablen in der BIBB/BAUA-Erwerbstätigenbefragung 2006. Unpublished manuscript.

ROHRBACH, Daniela, TIEMANN, Michael, 2009: Qualification- and skill-based mismatching in Germany. Unpublished manuscript.

⁵ Because the skill measures for occupations rely on a very small set of countries so far, the interpretation of current analyses are restricted in two ways: Firstly, in that most European countries do not have their own respondent-job cell information on task importance it is not clear in how far these countries would end up with the same skill distribution within occupations. If they would in fact differ, possibly this would lead to different conclusions on the nature and pace of skill demand changes in these countries. Secondly, it is not possible to verify the validity of the routine-nonroutine measures for cross-national analyses so far. Ideally, to close that gap a job task measure on the importance of specific activities would be surveyed within an cross-national survey at the worker-level.

ROHRBACH, Daniela, 2009: Knowledge Society and the returns to VET for individuals. A multilevel analysis of the German labor force. Paper presented at the *Effectiveness of Learning and Efficiency in VET Systems – Interdisciplinary Congress on Research in Vocational Education and Training*, 25.-27. March 2009, Zollikofen, Switzerland.

ROHRBACH, Daniela, 2009: German BIBB-IAB- and BIBB-BAuA Surveys on Qualifications and Working Conditions and FreQueNz, Invitation by Cedefop and OECD, International Seminar on Measuring Generic Work Skills Using the Job Requirements Approach (JRA), 12.-13. February 2009, Thessaloniki, Greece.

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