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Validating the ESeC-scheme as operationalization of social class

The case of Germany

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Editorial Note:

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Abstract

This working paper summarizes the results of a validation study of the recently developed European Socio-economic Classification (ESeC) for the German context. The ESeC project set out to construct a scheme to operationalize social class position with official microdata in Europe in a comparable way. This study focuses on criterion validation, evaluating for the German context the capability of the classification to measure its theoretical premises. An ideal German version fitting the national context was constructed and compared with a first prototype of ESeC developed in the UK. Several changes in the prototype lead to a final version of ESeC that shows rather high criterion validity for Germany and allows for a comparison of social positions between European countries.

Contents

1. Introduction

One of the core sociological concepts is social class. It is used both to characterize the nature of social stratification of societies as well as in explanations of diverse behaviours and attitudes of social actors. To operationalize the class concept in empirical research, especially in comparative studies, researchers often use the Erikson-Goldthorpe-Portocarero (EGP) class scheme (Erikson & Goldthorpe 1992). The underlying theoretical conception is based on the notion that class positions are defined by the nature of employment relations. Core distinctions are between employers, self-employed and employees, and among employees between different groups of workers whose employment is characterized by different contractual regulations which make their class position more or less advantageous.

This class scheme has been thoroughly validated for the UK (see Evans 1992), but the variants for other countries are mostly constructed on the basis of theoretical assumptions and informed judgement rather than on a systematic assessment of their validity. To construct the scheme, some of the available national variants also use information different from the British version, either to fit better to the national context or because strictly comparable information is not available. In order to improve on this situation, a team of researchers from various European countries has cooperated in the ESeC (European Socio-economic Classification) project[1]. While essentially building on the theoretical foundations of the EGP class scheme, the project aimed to develop a class scheme with improved international comparability and careful validation for a large number of European countries. The advantage of the ESeC scheme thus lies in the internationally harmonized construction of the coding scheme and the extensive validation by an international team of researchers.

Characteristics and foundations of social classes may differ between countries, and thus a crucial issue is whether a cross-nationally comparative measurement instrument to identify classes is able to capture such country specific particularities. The ESeC project paid particular attention to this issue and so does this paper which describes parts of the German validation study. It focuses on the criterion validity of the operationalization of ESeC for the German context, that is, it examines whether ESeC indeed measures what it purports to measure. In order to do justice to specific conditions prevailing in Germany, a national variant of ESeC was first constructed. We call this variant 'German ESeC'[2]. We started out with a prototype of ESeC previously constructed and validated for the UK and attempted to optimize its validity for Germany by changing details of its operational construction in ways to better capture special features of the German social structure. In a second step, this German ESeC was compared with the UK-based prototype of ESeC and with the findings from similar studies for other countries (Bihagen et al. 2006; Kunst et al. 2006; Rose & Harrison 2005b; Schizzerotto et al. 2006; Watson et al. 2006). This provided the basis for the construction of the international standard

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1 The project was carried out under the coordination of David Rose, University of Essex and funded under the EU-Framework Programme 6. The project homepage can be accessed at http://www.iser.essex.ac.uk/research/esec

2 The construction of the German ESeC is described in detail in Hausen et al. (2005a).

ESeC. In a third and final step, the international standard ESeC (developed in the second step) was compared to the German ESeC to examine any biases or losses of validity that may result when applying the international standard rather than the German ESeC to the German context. In a summary way, this paper covers all these steps and issues, but its main focus is on the third step. There the paper also explores the robustness of ESeC when it is built from different levels of measurement precision in the information needed for its operationalization. The paper thus informs on a broad range of validity issues when using ESeC to identify individuals´ class position in national and internationally comparative research.

The paper continues in section 2 by highlighting the particular problems of an internationally harmonized class schema and discussing characteristics of Germany's class structure that likely differ from those of other countries and therefore might be lost when applying an international measurement instrument. Section 3 briefly describes details of the ESeC classification and its theoretical background. Section 4 presents the indicators used in this paper to validate whether the classes distinguished and identified by the ESeC scheme adequately correspond to its underlying theoretical conception. It also gives details about the data used in the German validation study and the operationalization of ESeC with these data. Section 5 describes the construction of the German national ESeC and presents the results of its validation. Sections 6 and 7 examine the differences between the German and the international variant of ESeC and the extent to which the criterion validity of ESeC varies between these variants. Section 8 summarizes and highlights the main findings.

2. Specific features of Germany's class structure

Constructing measures that are internationally comparable and harmonized is of a particular challenge. Such measures should ensure an equivalent measurement of the same theoretical concept for different countries. This is especially difficult for areas in which the empirical manifestations of the concept vary between countries, for reasons such as specific historical traditions, institutional peculiarities, or cultural differences. In these instances, nationally specific conditions may be blurred or may not be adequately captured when following the principles of procedural equivalence in the measurement of a concept (Johnson 1998).

Social classes clearly belong to the realities in the social world that can vary substantially between countries in their empirical manifestation. Given the theoretical understanding that classes are differentiated through employment relations, various differences between countries make equivalent measurement difficult and may contribute to systematic measurement error. Company regulations and tax laws shape differently the boundary between employers, self-employed and employees throughout Europe. Labour (contract) regulations (by legislation or industrial relations agreements) have an impact on employment relations in general and on employment relations for specific groups of employees in particular. The share of the public sector and the proportion of civil servants in the work force vary greatly between countries. Different countries also develop a different understanding and contractual underpinning of management positions, executive employees or supervisors. In addition to these

differences in employment relations, differences in the language used and national traditions of measurement of various indicators may further lead to systematic biases of a cross-nationally valid measurement of ESeC.

Germany is a good test case for addressing these problems. Compared to the United Kingdom, which served as a prototype country for the first version of ESeC[3], Germany differs significantly with respect to both welfare state regulations and labour market regulations and policies. Germany is often portrayed as a typical example of a conservative welfare state which, while providing security against market vagaries and uncertainty, does much to secure the established standing and privileges of both classes and status groups. The UK, in contrast, is seen as a prime example of the liberal, residual welfare state, placing fewer constraints on the operation of markets and intervening only as a last resort (Esping-Andersen 1990). More specifically, in relation to class formation and employment relations, the two countries vary substantially in labour regulation and (de-)commodification of labour. Germany has its long tradition of sharply distinct categories of employees – blue-collar workers *(Arbeiter)*, white-collar employees *(Angestellte)* and civil servants *(Beamte)*. This distinction has been institutionally shaped and conserved through social and labour regulations since the late nineteenth century.

Especially civil servants are distinct as a group with contractual relations that include many privileges in terms of tenure, tax benefits and promotions. Civil servants are of particular importance in Germany because this group covers many occupations, such as teachers or (until recently) even postmen or train conductors who in other countries and, notably in the UK, are far from having civil servant status. The *Angestellte* group, which comprises most white collar employees in the private sector and those employees in the public sector who are not civil servants, receive treatment similar to the civil servants, although on a less advantageous level. In contrast, the *Arbeiter* – including most blue collar and some lower level service workers – for long worked under regulations with conditions typical of labour contracts. However, in the post WWII decades these conditions, especially for skilled workers, slowly and gradually improved and in terms of worker protection and social security came closer to the arrangements achieved for the *Angestellte*. Finally, in a 2005 Act of Parliament (*Gesetz zur Organisationsreform der gesetzlichen Rentenversicherung – RVOrgG*), the traditional distinction between *Arbeiter* and *Angestellte* within the old age pension scheme was abolished. While many *Arbeiter* are still hourly paid, in ever more branches of industry the mode of remuneration has developed in the direction of monthly salaries as received by the *Angestellte*. In sum, differences between Germany and the UK are manifold, with a generally higher level of job security in Germany, stronger protection against job losses, a more regulated labour market and institutionally distinct modes of employment relations between different categories of workers (Kocka 1981; Müller 1986).

In addition to these labour market characteristics, the role of education for labour market allocation also differs significantly between Germany and the UK. With its highly developed system of vocational

[3] Also the EGP/CASMIN class schema, on which ESeC is heavily based upon, has initially been developed for England and Wales.

education at the secondary level and its marked occupational orientation of higher education, Germany is among the countries in which educational qualifications strongly shape access to jobs in different classes. Germany is also well known for its marked occupational segmentation of labour markets, as well as for its pronounced differences between skilled and unskilled labour, all of which are related to the strong vocational/occupational orientation of the education and training system. In the UK, in contrast, the link between education and class position is comparatively weak; in particular the distinction between skilled and unskilled labour is less pronounced than in Germany (Blossfeld & Mayer 1988; Hillmert 2001; Müller & Shavit 1998).

Differences in the contractual regulation of employment, in the provisions of social security or in the educational systems – as exemplified here for Germany and the UK – are likely to have implications for the position of various groups of workers in the class structure. Similar differences in institutional or other conditions that are relevant for the class position of particular groups of workers also exist in other countries. One aim of this paper is to find out – for the case of Germany – how strongly they may impair the ability of an international class schema to validly represent the class structure of a particular country.

3. A brief description of the ESeC-scheme and its theoretical background

This section will sketch the theoretical background of the ESeC classes and their operationalization. A more thorough theoretical discussion of the differentiation of social classes can be found in several recent articles on this issue (Breen 2005; Goldthorpe 2000; 2007; Goldthorpe & McKnight 2006; Soerensen 2000). Rose and Harrison (2006; 2005a; 2007) describe in more detail how the ESeC-scheme has been implemented against this theoretical background. Several reports and articles of the ESeC project consortium can also be accessed online at http://www.iser.essex.ac.uk/esec/.

In the ESeC scheme nine classes are distinguished (see Table 1). The similarities with the EGP-class scheme are obvious. In contrast to measures for social status or prestige, the aim of these class schemes is not primarily to construct a vertical order of positions. Instead, the essential criteria for the distinction of the various classes are employment relations which might, but do not necessarily imply a hierarchical ordering. In terms of employment relations, a basic distinction within the class structure is first drawn among employers, self-employed and employees, “that is, among those who buy the labour of others, those who do not buy the labour of others but neither sell their own, and those who do sell their labour to an employer or employing organisation” (Goldthorpe 2007: 103). The significance of this distinction is quite evident in societies with private property and labour markets. Among the employees Goldthorpe then conceives further differentiations in terms of the “mode of regulation of their employment” (Goldthorpe & McKnight 2006). Different modes of regulating employment emerge on account of the basic problems usually encountered by employers, that is the problems of ‘work monitoring’ and ‘human asset specificity’ that may occur to a greater or lesser extent depending on the kind of work to which employees are contracted. Monitoring problems particularly arise when the amount and quality

of work cannot be monitored directly or as easily as in the case of e.g. assembly line work with standardized work tasks and fixed production pace. In contrast, problems of asset specificity arise, when high amounts of job specific human capital or loyalty are involved in performing a job and make both employers and employees interested in long term employment relations.

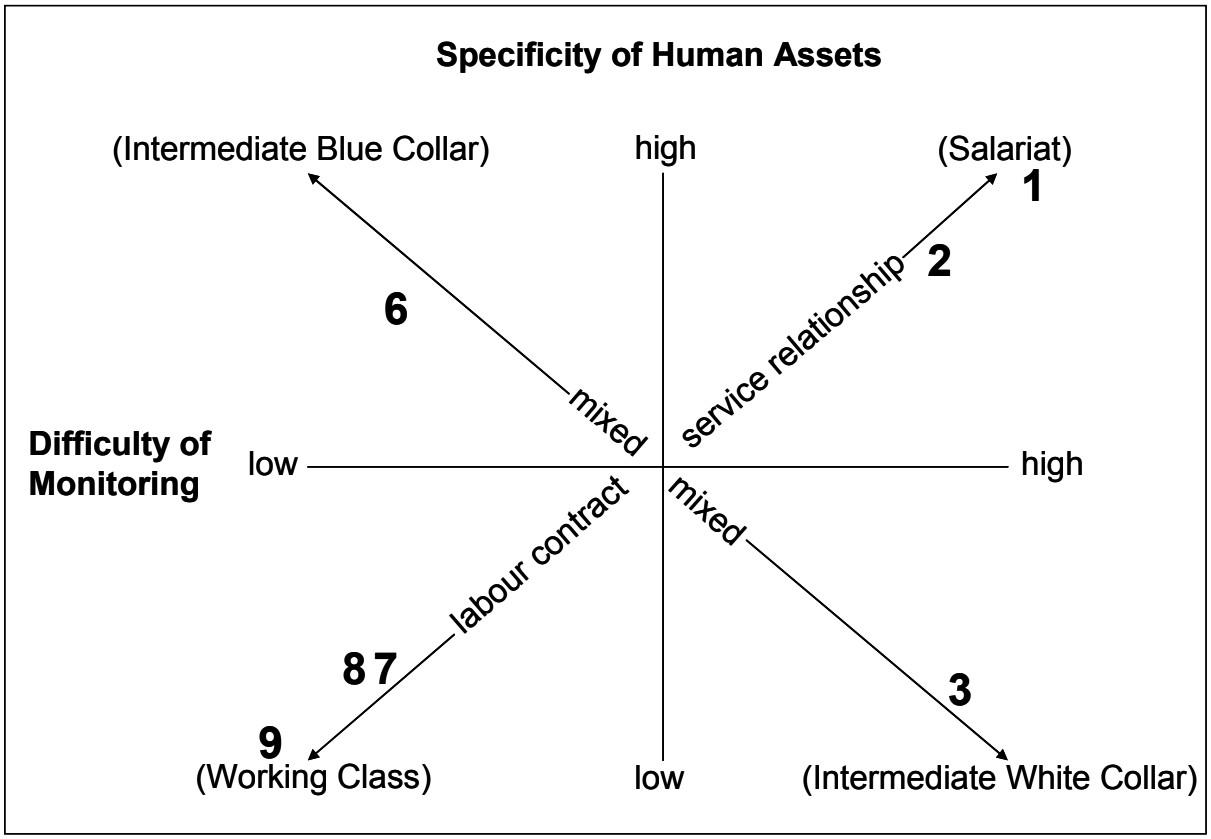
Table 1: The ESeC-Classes*

ESeC	Class Name	Occupational Groups	Form of regulation of employment
1	Higher salariat occupations	Large employers, higher grade professional, administrative and managerial occupations	Service relationship
2	Lower salariat occupations	Lower grade professional, administrative and managerial occupations and higher grade technician and supervisory occupations	Service relationship (modified)
3	Intermediate occupations	Intermediate occupations	Mixed
4	Self-employed and small employers	Small employers and self-employed (except agriculture)	-
5	Self-employed and small employers (agriculture)	Small employers and self-employed (in agriculture)	-
6	Lower supervisory/ technician occupations	Lower supervisory and lower technician occupations	Mixed
7	Lower services/sales/ clerical occupations	Lower clerical, services & sales occupations	Labour contract (modified)
8	Lower technical occupations	Lower technical occupations	Working contract
9	Routine occupations	Routine occupations	Working contract

* Table adapted from Harrison and Rose (2006: 5).

Different forms of employment relation are conceived by Goldthorpe as viable responses to the weaker or stronger presence of the described problems in different work situations. Work situations with low monitoring problems and low asset specificity can adequately and efficiently be handled by a *'labour contract'*, in which a quantity of labour is purchased on a piece- or time-rate basis, the most typical example being the case of unskilled work. In contrast, for work situations with high monitoring problems and high asset specificity the *service relationship* is a more adequate and better fitting response, "that is, a contractual exchange of a relatively long-term and diffuse kind in which compensation for service to the employing organisation comprises a salary and also important prospective elements – salary increments, expectations of continuity of employment (or at least of employability), and promotion and career opportunities" (Goldthorpe & McKnight 2003: 4). Modified versions of these basic forms of the labour contract and the service relationship are likely to occur with the skilled manual and routine non-manual workers on the one side, and the lower-level professionals, managers and technical grades on the other side. Figure 1 illustrates the assumed class-specific work situation and the contractual response for both the basic forms of labour and service contracts as well as for the 'mixed' forms in which elements of both the labour contract and the service relationship are assumed to be present and which are characteristic for the classes intermediate between the working class and the salariat.

Figure 1: Theoretical dimensions of the ESeC-classes and employment relations*



Source: Rose and Harrison (2007), adapted from Goldthorpe (2007: 118)

The salariat classes 1 and 2 are typical cases for the *service relationship*, their jobs require a high degree of specific human assets and are difficult to monitor. The classes 7, 8 and especially 9 are on the other end of this continuum. Jobs in these classes require little specific human capital and are easier to monitor. The classes 3 and 6 have mixed forms of employment relationships. Work of the intermediate (routine) white collar occupations in class 3 tends to be low in asset specificity, but can be difficult to monitor. In contrast, in work of technicians (class 6) problems of asset specificity are likely to arise, while difficulties of monitoring are seen as less serious.

While these considerations concern the major distinctions within the large group of employees, the employer and self-employed classes are further distinguished by the number of their employees and the economic sector of their business. Class 4 comprises the self-employed and small employers with less than 10 employees outside agriculture with the exception of professionals; class 5 includes all self employed in agriculture. Employers with 10 or more employees are included in class 1.

As in EGP the actual assignment of jobs to classes is based on detailed information about the occupation a job occupant holds. The operational procedures are built upon the combination of essentially four items of information: (1) Occupation as coded according to the Occupational Unit Groups (OUGs) of the International Standard Classification of Occupations 1988 (ISCO88-COM); (2) employment

status to distinguish employers, self-employed and employees, with additional consideration of (3) the number of employees if employer or self employed, and (4) if employee: whether holding a supervisor position or not. Given this information, the allocation of individuals to classes is then made according to a mapping matrix which defines the class assignment depending on the combination of the four items. Table 2 illustrates the mapping matrix for six exemplary OUGs (rows) and employment status combinations (columns). The numbers in the cells indicate the respective class assignment. According to this matrix, for example an employed machinery mechanic or fitter (ISCO-3-digit-code 723) would be mapped into class 8 (lower technical occupations) if he is not a supervisor. If he has supervisory status in his company, class 6 (lower supervisory/technical occupations) would be assigned. The full matrix of the final version of ESeC can be accessed online at http://www.iser.essex.ac.uk/research/esec/matrices-and-syntax.

Table 2: Class matrix for ESeC, some examples (final international version of ESeC)

OUG: ISCO88 (COM) Code	Occupation	Employment Status				
		Self employed: 10+ employees	Self employed: 1 to 9 employees	Self employed: no employees	Supervisor	Employee
214	Architects, engineers and related professionals	1	1	1	1	1
232	Secondary education teaching professionals	1	2	2	2	2
343	Administrative associate professionals	1	4	4	2	3
421	Cashiers, tellers and related clerks	1	4	4	6	7
723	Machinery mechanics and fitters	1	4	4	6	8
931	Mining and construction labourers	1	4	4	6	9

Basing class assignment on occupational information as coded in the International Classification of Occupations (ISCO) has the considerable advantage that this procedure profits from the highly standardized rules of coding jobs into a very detailed nomenclature of occupational titles. Such information is available for many data sets across the world because many statistical and scientific agencies use these standards to code occupations. This standardized process of detailed job coding and assigning them to classes thus in itself provides a good base for comparative research. In addition, it is a flexible instrument that allows easy and transparent variation in allocating specific jobs differently to classes if there are good grounds to assume that in a particular country a given job belongs to a different class than in other countries because for some reason its standing in that country differs from that in other countries. It is a transparent procedure to devise a national variant of a class schema that will be used below. But before that, we describe in the next section the data base and the specific procedures used to evaluate ESeC for the German case.

4. Data base, Employment Relations (ER) indicators for the validation of ESeC and variables for ESeC operationalization

Data base

The data requirements for a careful validation study of ESeC are manifold: The data have to include detailed information on Occupation Unit Groups (OUGs), on employment status and on supervisory position which are the basic elements on which ESeC is constructed. The data base must also include information on the base of which ESeC can be validated and it must contain a large sample of observations in order to allow detailed analyses at the OUG-level. The only data base for Germany which satisfactorily complies with all these requirement is the BIBB/IAB cross-sectional survey on the Acquisition and Use of Occupational Qualifications 1998/99. It is the main data source used in this paper. The data were collected by the Federal Institute for Vocational Education and Training (BIBB) in collaboration with the Institute for Employment Research (IAB). The sample is a random probability sample of the German labour force including 34,343 individuals, aged 15 years and above, in regular, paid employment for at least 10 hours per week in the survey period.

Employment Relations (ER) indicators used to validate ESeC

To validate ESeC a number of indicators are needed which can be used as criteria to examine whether the ESeC classes correspond to the theoretical premises outlined in the previous section, or in other words, indicators are needed to examine whether the jobs of workers assigned to a particular class indeed have the assumed typical characteristics of that class. For the German case two kinds of ER indicators have been derived for the validation of ESeC: (a) indicators which capture the weaker or stronger presence of the basic problems of difficulty of monitoring and asset specificity and (b) indicators which tap the assumed response to these problems, i.e. indicators for the assumed contractual relationship.

Work monitoring is measured by deriving factor scores from three items measuring the extent of standardisation of the work situation and the autonomy workers have in performing their tasks.[4] Respondents were asked to indicate how often (almost always/frequently/occasionally/rarely/hardly ever) the following specific aspects occur in their present job: (1) work tasks are prescribed in all details, (2) an identical work operation recurs in all details; and (3) a precise number of product units, a minimum work performance or the time to carry out a specific work task is prescribed. The combined factor of these three items (α = .66) is referred to as the 'autonomy factor' with high scores pointing to high autonomy and low scores pointing to low autonomy.

To operationalize asset specificity, we use information on the qualification the job holders perceive as required for their job. We do not assess qualifications which job holders possess in reality, but rather, as a characteristic of the job, the qualifications considered to be needed for the job. This was measured by two dummy variable indicators: (1) The proportion of job holders who indicate that at least a

[4] The BIBB/IAB data set does not include direct measures on monitoring problems.

master craftsman qualification, vocational college or tertiary education degree is required ('college degree'); and (2) the proportion of job holders who indicate that at least a vocational qualification or any higher degree is required ('any degree').[5]

To assess the presence of characteristics of a service relationship we use indicators to measure aspects of (1) future career prospects and (2) the varying length of the employment contract in a given job. Career prospects are measured by the extent of further education or training received in the previous five years (with the present employer). Further education is asset generation, but can also be seen as an indirect indication of investment for career prospects. To assess prospects for long-term employment a measure was constructed to indicate the average length of tenure individuals in a given job tend to have compared to the average length of tenure of all individuals of the same gender and with the same labour force experience.[6] Positive values on this indicator mean that length of tenure in this class or OUG is higher than the expected average for a given gender and number of years in the labour force. Negative values, in contrast, indicate shorter length of tenure.

Thus, in sum, the following ER indicators are used to validate ESeC:

Relating concept:	Indicator
Monitoring problem:	Work autonomy (factor score)
Asset specificity:	% of class members claiming that 'college degree' is required for job
Asset specificity:	% of class members claiming that at least 'any degree' is required for job
Career prospects:	% of class members who have received further education
Long-term employment:	Relative length of tenure

Not all of these measures are ideal indicators to capture the intended concepts and they cover only selected aspects of employment relations. However, the dataset available for the study did not provide other suitable information. In additional analyses (not reported in detail here) we have used a few ad-

[5] The two dummy variables were constructed by using information on the qualificational degree which job holders actually have and by combining this information with their assessment whether the job could be done by an employee with a lower qualification. For the actual qualificational degree, we distinguish between three levels of qualification: (1) no vocational qualification; (2) vocational school, vocational training etc. and (3) tertiary or vocational college education. We then generated a variable according to the qualificational degree and reduced this score by one unit whenever the respondent indicates that the job could be performed with a lower education than the respondent has. The dummy variable 'any degree' was coded when the resulting score was 2 or 3; the dummy variable 'college degree' was coded when the resulting score was 3.

[6] To construct the measure we first estimate by a regression equation for all cases the average number of years with the current employer controlling for number of years elapsed since first employment and for gender (as women interrupt their labour force participation more often than men). We then estimate the corresponding figure for all holders of a particular OUG-job. The difference between both measures indicates whether the average tenure of individuals in a given OUG job exceeds or is short of the average tenure of individuals in all jobs, given gender and time elapsed since first employment. This measure is used as an indicator of the relative length of employment that can be expected in a given job.

ditional and well suited validation indicators from data of the German Socio-Economic Panel (GSOEP). The results confirm what is found with the above list of indicators.[7]

Variables for ESeC operationalisation

As described above, ESeC is built from two pieces of information, employment status categories and ISCO occupational groups. An ESeC class is then assigned based on the combination of both information according to the mapping defined for the ISCO by employment status cells of the mapping matrix. For all versions of ESeC the same initial data have been used. The procedures differ only with respect to the level of aggregation of ISCO codes and whether we use a German-specific or the international mapping matrix to assign the ESeC classes.

The measurement of employment status distinguishes between employer/self-employed, employed supervisors and other employees. The following procedures were used to mimic the ESeC employment status concept:

Employer/Self-Employment was constructed according to the ESeC protocol. Cases of missing data on number of employees were assigned to the modal category of all valid observations, in case of the German data to the self employed category with 1 to 9 employees.

Supervisors and Employees: According to the ESeC User Guide[8] supervisors are employees who are neither managers nor professionals but who are responsible as their main job task for supervising the work of other employees. In Germany (as in many other countries), the concept of a supervisor is neither well defined nor are there strictly comparable operational procedures to measure supervisory status. Given the information provided in the BIBB/IAB data set, the following procedures proved to be the closest approximation to the ESeC protocol. Among respondents not previously coded as self-employed, all those were considered supervisors (and not employees) who had co-workers for whom they were direct supervisors *(Vorgesetzte)*, irrespective whether supervising is their main job or not, since this information was not available in the data (for a detailed discussion see Pollak et al. 2009).

Occupation: In the BIBB/IAB data, occupation is initially coded to the 4-digit national occupational classification *(Klassifikation der Berufe)*. Using the crosswalk routine provided by the German Federal Statistical Office, these codes were transformed into the 4-digit ISCO-88(COM) OUGs. Like the first UK-based draft of ESeC the German ESeC (and for all further analyses) used ISCO 4-digit codes (combined with the employment status categories) as basic mapping units for the ESeC classes. The international ESeC, in contrast, is based on a 3-digit ISCO-88(COM) (minor groups) by employment status derivation matrix. To assess the consequences of aggregation of ISCO information, a 3-digit and a 2-digit German ESeC version were defined using the modal value rule. That is, in a first step re-

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[7] The number of cases available in the GSOEP was not sufficiently large for detailed tests of the ESeC mapping matrix. Therefore the BIBB/IAB database was used as core data source, while the GSOEP data was used as an independent data base to cross-check at a higher level of aggregation results from the BIBIB/IAB data (see Hausen et al. 2005a, 2005b).

[8] see: http://www.iser.essex.ac.uk/files/esec/guide/docs/UserGuide.pdf. Effective [20/03/2009]

spondents are assigned an ESeC class code according to the 4-digit occupational information. The 3-digit and 2-digit occupation by employment status groups are then assigned the class code (resulting from the 4-digit information) most frequently found among the respondents included in the respective 3-digit or 2-digit groups.

5. The construction of the German national ESeC

We now begin describing the various validation steps and their results. As indicated above the first step was to construct a national variant of ESeC that is able to capture as adequately as possible specific features of the German class structure.[9] In a second step, the German ESeC was compared with the UK-based prototype of ESeC and with national variants of ESeC constructed by team members for other countries as well as with validation results from the European social survey covering a large set of European countries. The review and discussion of these results provided the basis for the construction of the international standard ESeC, which in the third and final step could then again be compared to the national variants to cheque how well it covers the national cases. In this section we describe the construction and validation of the German national ESeC, while in the next sections we will show how well the international ESeC corresponds to the German ESeC.

To construct the 'German ESeC' we started out with a prototype ESeC mapping matrix that was developed and validated earlier for the UK. The cases surveyed in the BIBB/IAB study were allocated to the respective prototype ESeC classes and the validation indicators were calculated for each of the classes. In the values of these indicators the different classes strongly and consistently differed from each other in the theoretically expected way. However, to improve on this and to take into account specific conditions prevailing in Germany a profile in terms of the various validation indicators was calculated for each OUG[10] and it was examined whether this profile fitted best into the assigned prototype ESeC class or a different one. The criterion used was the proximity of the values of the validation indicators calculated for the OUG examined with the values of these indicators for the various prototype ESeC classes. When the validation indicator values for an OUG were closer to those of another class than to those of the class assigned according to the prototype matrix, the OUG was moved to the better fitting class. Basically, the procedure adopted corresponds to a clustering algorithm. However, we did not use an automatic optimization procedure because we were also concerned to accommodate distinctions made in the prototype matrix between service occupations and technical occupations (such as between ESeC classes 7, 8 and 9). Through this process we attempted to obtain an ESeC allocation matrix that, in terms of the validation criteria, takes into account German peculiari-

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9 The construction of the German ESeC is described in full detail in Hausen et al. (2005a).

10 To be more precise: The examination was essentially done for four digits ISCO Occupational Unit Groups essentially considering workers with Employment Status 'Employee". Once the class allocation for the employees of a given OUG was decided, OUG-workers with another employment status category (Employers, Self-Employed, Supervisors) were treated according to the standard class allocation rules. In order to keep national deviations from the prototype matrix limited and in order not to be victim of unreliable sample contingencies reallocations were not pushed forward for every minor OUG. On average the OUGs concerned included 96 employees.

ties in the employment relations of various OUGs. It was also expected to improve, again in terms of the validation indicators, the within class homogeneity of the OUGs allocated to each class, as well as increasing the distinctiveness of the classes compared with one another.

Having defined a German ESeC allocation matrix, the validation indicators were re-examined at the class level for each of the resulting German ESeC classes. It turned out that the new German ESeC was indeed more adequate for the German data than the UK-based prototype ESeC. For each of the validation criteria the percentage of variance explained by the German ESeC was larger than or at least as large as that explained by the prototype ESeC. Of course, this outcome could be expected because we used the same data both to decide on OUG-ESeC allocations and to assess the improvement to ESeC's validity achieved by the reallocations. To circumvent this partial circularity, the comparison of the predictive power of both the prototype and the German ESeC was replicated using GSOEP data[11] and with slightly different validation indicators. Because for this independent German data set the German ESeC also proved to be superior to the prototype ESeC, it can be assumed that it does indeed capture class differences in employment relations better than the UK prototype. Thus, the German ESeC can be used as a sensible reference both to assess the relative appropriateness of the international ESeC and to compare the latter's ability to proxy a German national class schema.

Table 3 shows the ER indicators for the employee classes classified according to the German ESeC.

The values of these indicators reflect the ESeC class means of the five employment relations indicators. As can be seen, the values found for the different classes are consistent with theoretical expectations. The scores on the work autonomy factor decline when moving from the higher salariat (ESeC 1) to the routine occupations class (ESeC 9). The decline, however, is not completely linear. Holders of lower service jobs (ESeC 7) barely differ from ESeC class 3, while the lower supervisors and technicians (ESeC 6) in comparison have lower autonomy scores. This is consistent with Goldthorpe's (2007) argument that even highly qualified technical work (as in ESeC 6) likely involves fewer monitoring problems than routine service work (ESeC 7).

For asset specificity, the first indicator 'any degree' extends over a very wide range: from 21 per cent for the routine working class (class 9) to 91 per cent for class 1, with expected distinctions among the classes between these extremes. This indicator, however, hardly differentiates between the two intermediate classes (ESeC 3 and 6) and ESeC 8. The second indicator for asset specificity (college education required) shows a strong contrast between the higher and lower salariat and between these classes and all others. 'College degree' is also useful in differentiating between classes 3, 6 and 8, as it separates them in the expected order. In terms of career prospects and length of employment, class differences correspond to the theoretical expectations. 'Obtaining further education' strongly varies between classes, and employees in salariat jobs have considerably more years with their current em-

[11] The German Socio-Economic Panel (GSOEP) is conducted by the German Institute for Economic Research (DIW), Berlin.

ployer than employees in other classes. Tenure is especially low for lower service (ESeC 7) and routine occupations (ESeC 9).

Table 3: Validation indicators by ESeC-classes for employees, German ESeC based on ISCO-4 digit

ESeC-Classes	work autonomy (factor score)	required highest degree (%)		obtaining further education (%)	relative length of tenure
		any degree	college degree		
1. Higher Salariat Occupations	0.50	91.7	66.5	56.4	1.49
2. Lower Salariat Occupations	0.26	82.1	33.3	54.1	2.30
3. Intermediate Occupations	0.10	66.6	10.4	36.6	0.24
6. Lower Supervisory, Technician Occ.	-0.22	67.8	13.3	32.2	0.18
7. Lower Services, Sales, Clerical Occ.	-0.02	34.2	2.3	12.3	-2.64
8. Lower Technical Occupations	-0.47	66.8	3.8	17.7	-0.63
9. Routine Occupations	-0.67	21.1	1.4	8.5	-3.28
Relating Concept	monitoring problems	asset specificity	asset specificity	career prospects	long-term employment

Data Source: BIBB/IAB 1998/99.

Across all indicators, the German ESeC classes clearly differ from each other and form consistent clusters in the theoretically expected way.

In light of suggestions developed through several other national validation studies similar to the one just described for Germany, in the second step, the prototype ESeC matrix was revised and finally the syntax for the international ESeC was developed (see the ESeC User Guide at http://www.iser.essex.ac.uk/esec/). This international ESeC emerged in an iterative process attempting to accommodate requirements from various national validity concerns. Since the international ESeC is now proposed for comparative studies it is most interesting to compare the German ESeC not to the prototype ESeC (as in Hausen et al. 2005b), but to this new international ESeC. In the following sections we turn to these comparisons both in terms of the resulting class distributions and the validation indicators used.

6. Differences in OUG composition and class distribution between the German and the international version of ESeC

In this section we describe the differences between the German ESeC and the international ESeC in terms of both OUG composition and the resulting distribution in the size of the various classes. While the German ESeC is based on 4-digit ISCO codes, the international ESeC uses only 3-digits because in many data bases ISCO is only available on this level. Therefore, there are two major sources of discrepancy between the German and international ESeC: (1) *allocation discrepancies* resulting from na-

tional specificities in employment relations which lead to a different OUG-to-ESeC allocation; and (2) *aggregation discrepancies* deriving from using less detailed occupational information. We explore how each leads to coding divergences when moving from the German to the international ESeC.

Table 4 displays the distribution of the German classes compared to the international ESeC classes. The numbers are percentages, based on the total number of cases (cell percentages). First, one should notice the high correspondence between the two versions: about 86 percent of all OUGs are assigned to identical classes (diagonal cells) while only 14 percent are allocated to different ones (off diagonal cells). Moreover the divergences are concentrated among a few classes and vary between 0.1 and 3 percentage points. The vast majority of the divergences observed between the two ESeC variants are due to allocation discrepancies. Less than one third of the exchange is caused by aggregation discrepancy that is by using ISCO-3-digit instead of ISCO-4-digit.[12] In the following we examine some of the most important deviations (cells in table 4 which represent more than 1 per cent of all respondents) and indicate the reasons why some OUGs were coded differently in the German and international versions of ESeC.

We begin with the cell indicating a move from German ESeC class 1 to international ESeC class 2 (2.7 per cent of all cases). About two thirds of these moves are due to different allocations of OUGs, and most of these concern two OUGs: secondary education teachers (ISCO 2320) and public service administrative professionals (ISCO 2470). Both groups have a considerable share within Germany's large public sector. In the international ESeC, all teachers in primary and secondary education are assigned to class 2. However, at least in Germany, there are important differences among teachers in terms of educational requirements (higher versus lower tertiary education) and work autonomy, and also with respect to their position in the civil service hierarchy and wage scale. Beside these differences, basically all teacher groups report consistently higher validation indicators than the average for class 1; thus all of them could go to class 1. However, as secondary education teachers at the Gymnasium[13] especially stand out, they were assigned to class 1 in the German ESeC and make up a considerable part of the 'class 1 to class 2 movers'. Regarding 'public service administrative professionals' both ESeC variants agree in allocating rank-and-file employees to class 2. Yet in the international ESeC administrative professionals who take up a supervisory position are also allocated to class 2. However, for the German ESeC the optimal allocation of this latter group turned out to be class 1 because a supervisory position in this OUG comes along with high scores on career prospects and exceedingly high ones on length of tenure.

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[12] These results come from additional analyses not documented in the present paper.

[13] The teachers in *Gymnasium* secondary education are not distinguished from other teachers in the 4-digit ISCO classification, but they can unambiguously be identified by using the German national occupational classification in addition to ISCO. Using this information for the construction of the German ESeC, ISCO OUG 2320 was split into a newly defined OUG 2321 for upper secondary teachers at the Gymnasium (class 1) and an OUG 2322 for all other secondary education teachers (class 2).

Table 4: Distribution of ESeC classes: German version compared to the international version

German ESeC[1)]	International ESeC[2)]										
	1	2	3	4	5	6	7	8	9		
	total percentages									Total	N
1	9.1	2.7	0.0	0.2	0.3	0.0	0.0	0.0	0.0	12.4	4217
2	0.8	19.4	0.2	0.1	0.0	1.4	0.0	0.0	0.0	21.9	7474
3	0.0	0.5	12.3	0.0	0.0	0.0	3.0	0.0	0.1	15.9	5415
4	0.0	0.3	0.0	6.7	0.0	0.0	0.0	0.0	0.0	7.0	2392
5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	78
6	0.0	1.4	0.0	0.0	0.0	9.3	0.0	0.3	0.0	11.0	3747
7	0.0	0.0	0.1	0.0	0.0	0.0	6.3	0.0	1.0	7.3	2497
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	0.4	11.6	3958
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	11.8	12.7	4327
Total	9.9	24.3	12.6	7.0	0.6	10.8	9.3	12.3	13.3	100.0	
N	3363	8298	4281	2398	197	3671	3162	4191	4544		34105

[1)] based on ISCO 4-digit (OUG); [2)] based on ISCO 3-digit (minor groups)
Stayers (diagonal cells) = 86.2%; Movers (off diagonal cells) = 13.8%

Data source: BIBB/IAB 1998/99.

Only a third of the moves between German ESeC class 1 and international ESeC class 2 are due to aggregation discrepancy. Focusing on these cases we can illustrate the loss of information and increased heterogeneity brought about when using ISCO 3-digit occupational information instead of 4-digit. In this particular example the moves are largely caused by occupations in the ISCO minor group 'social science and related professionals' (ISCO 244), which in turn is composed of six OUGs (2441 to 2446[14]). All of these OUGs are in class 1 except social work professionals who are in class 2. However, when ESeC is based on ISCO 3-digit (i.e. minor groups), the class assignment is determined by the modal ESeC class frequency of the OUG distribution in the corresponding minor group. In our example this is ESeC 2 represented only by social work professionals with a share of 54 percent. In consequence, all other OUGs included in the minor group also go to class 2. Consequently ESeC classes based on 3-digit minor groups are likely to be more heterogeneous in terms of employment relations than when based on 4-digit OUGs.

Further examining table 4, we find that a considerable number of divergences concerns moves from German ESeC class 2 to the international ESeC class 6, and even more from German ESeC class 3 to international ESeC class 7. In both cases basically the same OUGs are involved, but the class 3 to

[14] Economists; sociologists, anthropologists and related professionals; philosophers, historians and political scientists; philologists, translators and interpreters; psychologists and social work professionals

class 7 moves relate to employees, while the class 2 to class 6 moves concern supervisors in the respective OUGs. Here again, the coding divergences derive from allocation discrepancies (in about three quarters of the cases) as well as from aggregation discrepancies. In the case of allocation discrepancies, the OUG mainly involved is 'institution-based personal care workers' (ISCO 5132). In Germany, personal care workers constitute a large group and are mainly composed of medical or dental aids in doctor´s surgeries or clinics. The occupations are among the most favoured vocational training occupations for women in Germany. While personal care workers in the international ESeC are either allocated to class 6 (supervisors) or class 7 (employees), the findings for Germany indicate that not only is the qualification required for these jobs higher than the averages for classes 6 and 7 respectively, but they also imply better career and long term employment prospects. Therefore the optimal allocation of personal care employees in the German ESeC is class 3 and for supervisors class 2. Concerning *aggregation discrepancies* it is mainly police officers (ISCO 5162) which, when using minor groups for the construction of ESeC, change class position from class 2 to class 6 (when supervisor) or from class 3 to class 7 (when employee). This 'degrading' of police officers in the international ESeC occurs because in the 3-digit ISCO police officers are part of the minor group 'protective services workers' (ISCO 516), and for this aggregate group the modal classes are 6 and 7, since it is dominated by the so-called 'protective services workers not elsewhere classified' (ISCO 5169). This is a further typical example that ESeC based on minor groups can lead to an undesirable blurring of class composition.

Finally we draw attention to the 1.4 per cent cases moving from German ESeC class 6 to international ESeC class 2, which is almost exclusively a consequence of allocation discrepancies. Involved here are mainly technicians OUGs, such as chemical and physical science technicians; electronics and telecommunications engineering technicians; draughts persons, life science technicians, agronomy and forestry technicians and optometrists and opticians (ISCO 3111, 3114, 3118, 3211, 3212, 3224). In Germany this technicians group – when employees – does have distinctly lower scores on the ER indicators than the average of class 2. Especially with regard to autonomy and career prospects their scores point to class 6 rather than to class 2. Therefore, in the German version, employees in these OUGs are assigned to class 6, while supervisors are mostly allocated to class 2 – like in the international version.

Table 5: Distribution of ESeC German version (GV) and international version (IV) by ISCO 4-, 3-, 2-digit and gender (Column %)

ESeC	GV 4d	GV 3d all	GV 2d	IV 3d all	GV 4d men	GV 4d women	GV 3d men	GV 3d women	IV 3d men	IV 3d women
1. Higher Salariat Occupations	12.4	10.8	12.2	9.9	16.2	7.4	14.6	5.9	13.3	5.4
2. Lower Salariat Occupations	21.9	24.9	21.2	24.3	19.6	24.9	22.4	28.1	21.3	28.3
3. Intermediate Occupations	15.9	16.2	16.6	12.6	7.4	26.9	7.9	26.9	5.5	21.6
4. Self employed (non prof)	7.0	7.2	7.2	7.0	7.5	6.4	7.8	6.5	7.6	6.3
5. Self employed (Agric.)	0.2	0.2	0.2	0.6	0.2	0.3	0.2	0.3	0.7	0.4
6. Low. Supervis./ Technician	11.0	9.0	8.8	10.8	14.0	7.1	11.9	5.3	14.4	6.0
7. Low. Services/ Sales/Clerical	7.3	7.7	9.9	9.3	2.7	13.3	2.6	14.3	4.1	16.0
8. Low. Technical Occupations	11.6	12.3	12.4	12.3	18.0	3.3	19.1	3.6	18.9	3.7
9. Routine Occupations	12.7	11.6	11.4	13.3	14.3	10.6	13.4	9.3	14.2	12.2
Total	34,105	34,105	34,105	34,105	19,242	14,863	19,242	14,863	19,242	14,863

Data Source: BIBB/IAB 1998/99.

Having described the most important coding discrepancies between the German and the international ESeC, we now turn to the effects of different coding procedures on the resulting class distributions. Table 5 shows the class distributions for both versions, for different aggregation levels and differentiated by gender. Comparing – within the German ESeC – the distributions resulting from using different levels of ISCO occupational coding we see the effects of aggregation discrepancies. The comparison of the German 3-digit ESeC with the international ESeC, in contrast, mainly reflects the effects of allocation discrepancies. We can see that different levels of aggregation of occupational coding produce noticeable variations in the class distributions. They are most marked in the salariat classes and the lower supervisory class. The total share of the salariat classes is slightly higher (36 per cent against 34 per cent) when using ISCO 3-digit instead of ISCO 4-digit, and the higher-lower salariat ratio increases sizeably in favour of the lower salariat. This growth of the lower salariat is nurtured in more or less equal shares by downward moves from the higher salariat and upward switches from the lower supervisory/technician occupations[15]. At the same time the share of the lower supervisory/technician occupations decreases from 11 to 9 per cent, which is matched by an increase in the size of the lower technical occupations. Surprisingly, 2-digit occupational coding results in salariat classes of size simi-

[15] This conclusion is based on inspection of coding mobility tables, analogous to the one shown in table 4, but not shown here.

lar to those found with 4-digit coding. However, the share of class 6 remains low, being compensated this time by a larger share by class 7. If the focus is on the *international ESeC*, the share of the salariat classes closely corresponds to the German 3-digit version, but is lower than in the German 4-digit version. The proportion of the intermediate class is considerably lower in the international ESeC than in all German versions. The small size of the intermediate occupation class in the international version is mainly due, as indicated above, to the downward coding of occupations such as personal care workers and police officers to the lower services class when applying the international ESeC classification rules.

The different coding procedures also affect gender differences in class distributions (see columns 5-10 in table 5). Nevertheless the typical pattern of gender segregation in class positions becomes evident with all coding procedures: The share of women in the higher salariat, lower supervisory and lower technical and routine occupations is considerably lower than for men. In contrast, more women than men are in the lower salariat, as well as in intermediate and lower service occupations. However, it also becomes evident that the OUGs which have been moved from German ESeC 3 to international ESeC 7 are mainly ones hold by women, such as the already mentioned personal care workers. At the same time another OUG, mainly held by women in Germany that is waiters, waitresses and bartenders, moves from German ESeC 7 to international ESeC 9. As a result of all this, the German ESeC shows a slightly less disadvantaged class distribution for women than the international ESeC: According to the German 4-digit ESeC, more women than men (by 6.9 per cent) belong to one of the least advantageous classes, class 7 or 9 (17 per cent of men; 23.9 per cent of women); but in the international ESeC a difference of 9.9 per cent prevails (18.3 per cent of men; 28.2 per cent of women). Depending on the procedure used, one may diagnose somewhat more or less gender disadvantage.

Further insights on the implications of different coding procedures can be gained from table 6 in which we summarize the divergences arising from the different procedures and distinguish between coding moves among and between the three groups of classes which are most distinct from each other in terms of the theoretical basis of the schema: the salariat classes, the intermediate classes and the working classes. Moves between these class groups more seriously question the acceptability of a procedure, than moves among classes within a group. Fortunately we find that, for the large majority, each of the procedures assigns cases to the same class. Not surprisingly the correspondence is largest when the aggregation level varies from only four to three digits with otherwise constant German coding conventions. In all comparisons shown in table 6, moves between different groups of classes are slightly more frequent than moves among classes of the same group. Nevertheless, practically all these moves occur between neighbouring class groups and there are practically no cases in which one procedure assigns a respondent into the salariat and the other into one of the working classes or vice versa. As to the comparison which is most crucial for our analysis: compared to the 4-digit German ESeC, the international ESeC codes 8 per cent of cases into a different group of classes. Given that these class groups are, so to speak, theoretical neighbours to each other, the conclusion can be drawn that the different procedures at large lead to broadly similar class assignments.

Table 6: Coding mobility between different ESeC versions

	GV[a)] 4-digit to GV 3-digit	GV 4-digit to GV 2-digit	GV 4-digit to IV[b)] 3-digit	GV 3-digit to IV 3-digit
Unchanged	91.2	84.0	86.2	88.7
Moves among salariat classes	2.1	4.1	3.5	2.5
Moves among intermediate classes	0.0	0.0	0.0	0.0
Moves among working classes	1.9	2.3	2.3	2.0
Moves between salariat and intermediate classes	2.7	5.7	4.5	3.3
Moves between intermediate and working classes	2.0	3.9	3.5	3.4
Moves between salariat and working classes	0.0	0.0	0.0	0.0

[a)] GV: German ESeC version; [b)] IV: International ESeC version

Data Source: BIBB/IAB 1998/99.

Summarizing the differences in class distributions found in table 6 between the German 4-digit and the international ESeC, one general observation is that the international ESeC assigns somewhat larger proportions of employees to classes with less advantageous characteristics than does the German ESeC. It assigns more employees to the lower rather than the higher salariat; and it assigns more employees to classes 7-9 rather than to class 3. Given the general features of German labour market regulations and the German qualificational system, these differences can be expected from specific characteristics of Germany's institutional arrangements in these areas. The tendency of the international ESeC to downgrade several occupations is somewhat more pronounced for occupations typically held by women and, as a consequence, produces a slightly larger gender gap than the German ESeC in the assignment of men and women into the least advantageous classes.

7. Criterion validity of the different ESeC versions

Small but noticeable proportions of individuals are mapped differently into ESeC depending on the procedure used. This is due both to discrepancies arising from using different levels of aggregation of the occupational information and from differences in the allocation of occupations to ESeC classes, as a result of partial differences in the patterns of employment relations of various occupations in different national labour markets. But what are the precise implications of the different coding procedures for the validity of ESeC in terms of the employment relations criteria? Does the German variant of ESeC, with its differences from the international ESeC in terms of class assignment and class distribution, outperform (for Germany) the international ESeC in validity terms? To answer these questions, we draw on two sets of results:

(1) Measures of R^2 or Pseudo R^2 (in the case of logistic regression) for models which regress the various validation criteria on the dummy-coded ESeC classes. Variance of the different validation indicators explained by class is a sensible, even though rudimentary indicator to assess validity, because

increasing R^2 indicates that there is either more variance in the criterion variables between classes and/or there is less variance within classes, i.e. either between class differences increase, or within-class homogeneity decreases, or both effects occur at the same time.

(2) We show how the class specific means of the different validation indicators vary by using different versions of ESeC.

Table 7: Variance explained in validation criteria with international matrix and Germany-specific ESeC allocation matrix

	GV 4-digit	GV 3-digit	GV 2-digit	IV 3-digit
R^2				
Working Autonomy	14.1	13.6	12.7	13.2
Relative length of tenure	5.4	4.9	4.2	4.9
Pseudo-R^2				
Required highest degree:				
Any Degree	17.1	16.2	14.9	15.7
College degree	25.3	23.2	23.4	22.9
Further Education obtained	11.8	11.3	10.2	10.5

Data Source: BIBB/IAB 1998/99

As can be seen in table 7 for the BIBB/IAB data, R^2 declines for all validation criteria when we move from the German 4-digit ESeC to a German ESeC based on less detailed occupational information. The decline of R^2 indicates losses in class internal homogeneity and/or in the discrimination of the between class profile. The higher the level of aggregation in occupational coding, the stronger the reduction in the explained variance, i.e. the criterion validity of ESeC declines. The international ESeC also performs worse in terms of predictive power in all criteria, even when compared to the 3-digit German ESeC. Compared to the 4-digit German ESeC, we find a marked loss in predictive power for several validation criteria. If we contrast the loss of validity due to aggregation with the loss due to the move from the German to the international ESeC using the same aggregation level, the consequences of aggregation appear to be slightly more severe. This is somewhat surprising given our earlier finding that differences in class assignment depend on allocation rather than on aggregation discrepancies. However, aggregation may have a smaller effect on the number of cases assigned differently to classes, but the class switches of the cases involved may have a stronger bearing on the validity of ESeC.

The fact that the explained variance declines for every single indicator, and not just for some, indicates that detailed occupational coding and the concern for national specificities are important to do justice to the broad and multidimensional nature of class characteristics. Similar consequences resulting from detailed occupational coding and national specificities are found when using a different data base and operationally different validation indicators (Hausen et al. 2005b: 38, table 11).

A second way to assess the validity implications of the international harmonization is to compare the class means of the validation indicators generated by different procedures. Results can be seen from the following figures 2-6. The figures also show the Bonferoni-corrected 95 per cent confidence intervals, which allow an assessment of the stability of the findings against sampling variability.

The different ESeC construction procedures produce some differences for most of the indicators, but as a rule the variation in results is small. The following two differences appear most clearly: First, for several indicators, the two salariat classes are less distinct from each other in the international version than in the German ESeC. This is true in terms of asset specificity (college degree) and in terms of career prospects (receiving training and further education). Concerning long-term employment, jobs in the higher salariat appear to be slightly less advantaged than those in the lower salariat. This is especially pronounced in the international version. Second, again according to several indicators, the lower services, sales and clerical occupations (ESeC 7) appear to be defined in the international version in ways that move them closer to the intermediate classes. In the German version they are clearly closer to the routine occupations, where in fact they should be placed according to the theoretical conception. Another minor variation between procedures concerns the results for autonomy in work. Here the international ESeC moves class 3 somewhat closer to class 2 and class 9 closer to 8 than does the German ESeC. All in all, the German ESeC produces a slightly sharper class profile with differences corresponding better to theoretical expectations. However, these differences are small. Inspection of the within-class standard deviation for the various indicators (not shown) indicates a tendency of growing heterogeneity within classes when using occupational information at a higher level of aggregation or when moving from the German to the international ESeC, but differences are rather small and not completely consistent.

Figure 2: ER-indicator – Working autonomy (factor scores)

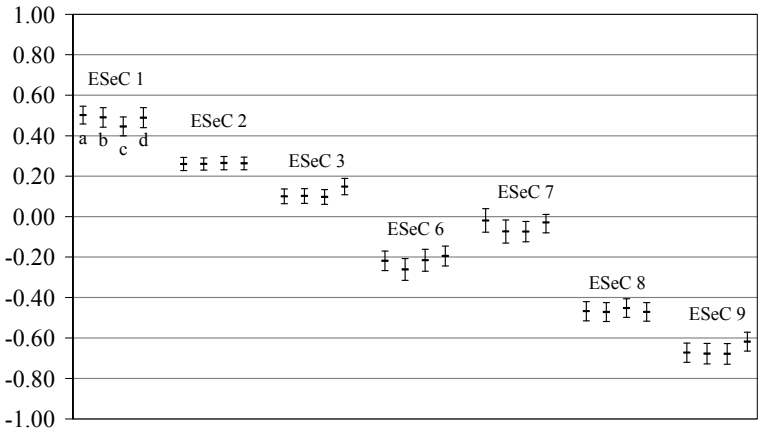


Figure 3: ER-indicator – Relative length of tenure

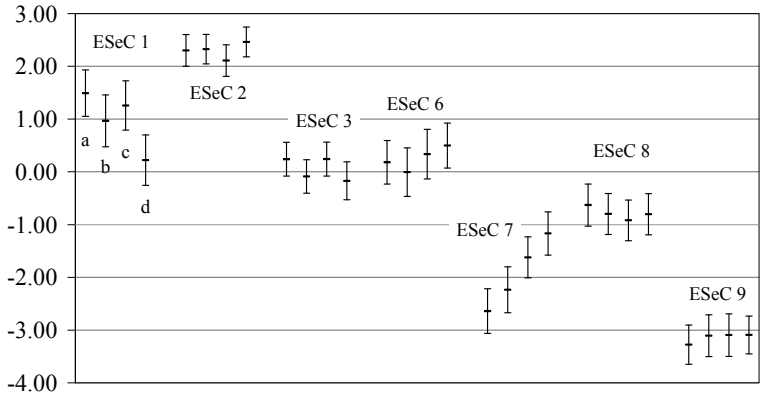


Figure 4: ER-indicator – Required highest degree: any degree (%)

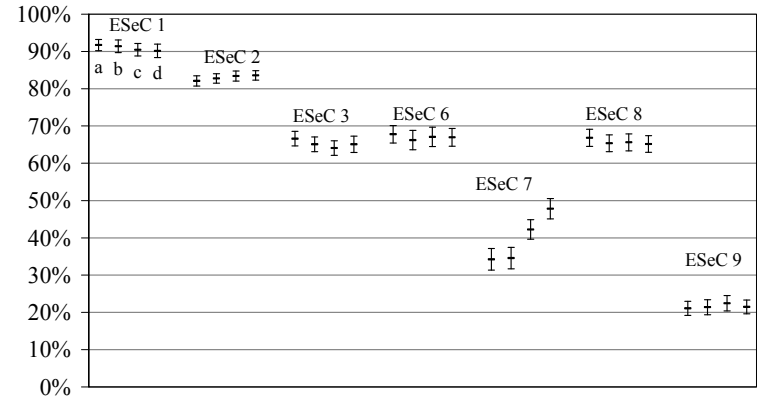


Figure 5: ER-indicator – Required highest degree: foreman education/college (%)

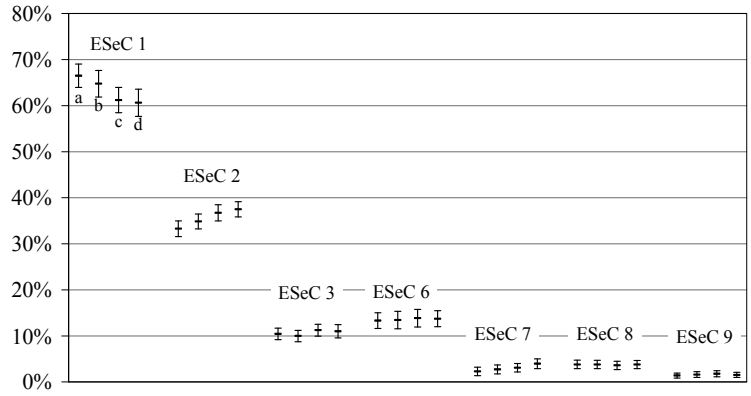
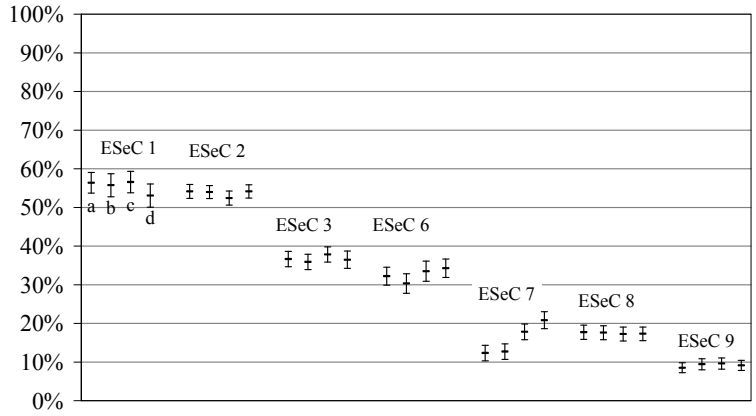


Figure 6: ER-indicator – Obtaining training and further education (%)



a ESeC German Version, based on 4 digit ISCO-COM
b ESeC German Version, based on 3 digit ISCO-COM
c ESeC German Version, based on 2 digit ISCO-COM
d ESeC International Version (based on 3 digit ISCO-COM)

Note: self-employed are excluded.

Confidence intervals are at the 95% level of confidence and corrected using the 'Bonferoni'-Procedure to make comparison between each ESeC-class possible.

Data source: BIBB/IAB 1998/99.

8. Discussion

In this working paper we have examined two elements that may restrict the ability of ESeC to classify the socio-economic position of individuals in an equally valid way cross-nationally. First, due to conditions varying by national contexts, the best fitting allocation of occupational unit groups to ESeC classes (in terms of employment relations) may vary across countries. Thus, an international standard allocation procedure may more or less adequately capture the class position of individuals in different countries. Second, the validity may be limited by using highly aggregated occupational information instead of detailed occupational unit groups. From comparisons of the German ESeC (produced for dif-

ferent aggregation levels of occupational coding) with the international ESeC, we see that indeed both elements lead to reduced validity.

The differences due to allocation discrepancies are in line with the expectations stated in the beginning of this working paper. Due to both particular labour market regulations for different groups of employees and an occupationally oriented educational system, employment relations in Germany have developed differently from other countries. The divergences in allocations between classes 1 and 2 are probably related to the existence of a distinct status for civil servants, offering a privileged service-type contract to more occupations than in countries such as, for example, the UK. The somewhat larger share of the intermediate classes (reducing the proportion of the lower service and routine occupations classes) is likely to result at least partly from the specific conditions of the German vocational training system. For a very large proportion of occupations training investments are required, which also lead to the provision of similar (intermediate) work conditions and employment relations for a larger share of occupations than in other countries.

However, one should also note that the differences between the German ESeC and the international ESeC are not as pronounced as one could have expected. Even though it was the explicit aim of this exercise to demonstrate a higher validity when applying a national classification compared with an international one, such a result only emerged to a moderate extent. However we must also consider whether the differences between the German ESeC and the international ESeC are somewhat underemphasized. When constructing the German ESeC, we rather closely followed the defaults given by the UK-based first version of ESeC. We allocated occupational unit groups differently to classes only for those occupations which were represented by a sufficient number of cases in our data and whose validation indicators clearly suggested a reassignment to a different class. Even so, taking both aspects into account, we can conclude that the international ESeC comes rather close to an 'optimal' German ESeC and that the validity losses by using the international standard procedure to construct ESeC are quite small. As Germany with its marked institutional specificities can be seen as a crucial test case, ESeC appears to be a rather robust instrument well suited for international comparative research.[16] Needless to say: similar research examining this conclusion for other countries would be highly useful and desirable in order to test the validity of ESeC throughout Europe.

Constructing ESeC with different levels of aggregation of the ISCO88(COM) classification, we found a clear loss of validity when moving from the 4-digit to the 3-digit level, and even more so when moving from the 3-digit to the 2-digit level. Therefore, ESeC should be constructed whenever possible on the most detailed occupational coding available.

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[16] The main focus of our study was to assess the validity of an internationally harmonised measure of socio-economic positions (i.e. ESeC) for Germany. As there used to be finer distinctions in employment relations in Germany which were not considered for the construction of ESeC, some national classifications (e.g. *Berufliche Stellung, Stellung im Betrieb*) may map the social structure more accurately than even the German variant of EseC (see Hausen et al. 2005a).

Finally, the simple comparison of the distribution of the classes by gender illustrates that different ways of constructing ESeC also has implications, even if small again, on substantial research findings. Further analyses focussing on the construct validity of ESeC in several substantive areas and for different countries would thus also be highly valuable.

9. References

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