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The Polarization Myth: Occupational Upgrading in Germany, Spain, Sweden, and the UK, 1992–2015

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Abstract

The consensus view in economics is that labor markets are polarizing as job creation takes place in high-skilled and low-skilled occupations, while jobs shrink in midskilled ones. The authors argue that, in theoretical terms, polarization runs counter to all the trends that shaped the job structure over the past decades: skill-biased technological change, the international division of labor, and educational expansion. The authors then show that the polarization thesis does not hold empirically. They use the European Labor Force Survey to analyze occupational change for Germany, Spain, Sweden, and the United Kingdom from 1992 to 2015 and define good and bad occupations with four alternative indicators of job quality: earnings, education, prestige, and job satisfaction. Job growth was by far strongest in occupations with high job quality and weakest in occupations with low job

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quality, regardless of the indicator used. The authors find clear-cut occupational upgrading for Germany, Spain, and Sweden. In the United Kingdom, the data support the polarization thesis when job quality is measured with earnings. If job quality is defined with education, prestige, or job satisfaction, the results show occupational upgrading. In all four countries, production workers and office clerks lost ground, whereas employment strongly expanded in the salaried (upper) middle class among managers and professionals.

Keywords
occupations, polarization, upskilling, Europe, social class, job quality

Over the past few years, the view that the labor markets of Europe and Northern America are polarizing has become widely accepted in economics (Autor & Dorn, 2013; Autor, Katz, & Kearney, 2008; Goos, Manning, & Salomons, 2009, 2014). Employment polarization is defined as jobs growing both in highly paid and low-paid occupations but decreasing in midpaid occupations. The result is the hollowing out of the employment structure and, supposedly, the erosion of the (lower) middle class. In a recent report, the Organisation for Economic Co-operation and Development (OECD, 2017) embraces this view and argues that "over the past two decades, all regions considered have experienced a process of polarization away from middle-skill jobs to low- and high-skill employment" (p. 80).

An evolution where employment grows only at the upper and lower end of the skill structure but shrinks in intermediate occupations would be no less than revolutionary. It fundamentally contrasts with the European experience of the past 40 years where technology constantly increased the demand for high-skilled staff at the expense of low-skilled personnel, where the onset of globalization shifted labor-intensive mass production from the North to the South, and where educational expansion massively augmented the supply of mid- and highly qualified workers (Crouch, 1999; Tåhlin, 2007).

Of course, upgrading trends from the past do not automatically translate to the present and future. Still, the finding of employment polarization is paradoxical because it seems to run counter to all the forces that shaped the job structure over the past few decades: skill-biased technological change, the international division of labor, and educational upgrading.

Our article resolves this paradox by showing that the empirical evidence for job polarization does not hold for Western Europe. When analyzing occupational change for Germany, Spain, Sweden, and the United Kingdom from 1992 to 2015, we find clear-cut occupational upgrading. Contrary to the most influential comparative studies in economics (Goos et al., 2009, 2014; OECD, 2017), our analysis includes the entire workforce (notably also agricultural workers, migrants, the self-employed, and civil servants), uses disaggregate measures of occupations, and rank orders occupations into five even-sized groups based on several indicators of job quality.

Our article thus joins a handful of comparative studies in sociology that show that unlike in the United States (Dwyer, 2013; Wright & Dwyer, 2003), there has not been any pervasive job polarization in Western Europe (European Foundation for the Improvement of Living and Working Conditions, 2015; Fernández-Macías, 2012; Fernández-Macías & Hurley, 2017; Oesch, 2013; Oesch & Rodríguez Menés, 2011; Tåhlin, 2007).

After the seminal article by Wright and Dwyer (2003) on polarization in the United States, research on change in the employment structure has commonly defined the quality of jobs with earnings. Occupations are thus considered as good if they are highly paid and as bad if they are low paid. Our article examines as to whether this sole focus on earnings leads to a ranking of occupations—and, linked to it, an aggregate pattern of employment change—that properly reflects the quality of work in growing and declining jobs. If job quality is a multidimensional concept, it may not be usefully reduced to wages (Muñoz de Bustillo Llorente, Fernández-Macías, Antón, & Esteve, 2011).

We examine occupational change with four indicators of job quality: an occupation's median work income, level of education, prestige, and job satisfaction. The literature on job quality often emphasizes a single dimension, with different disciplines preferring different indicators: Economists focus on pay, sociologists on skill and autonomy, and psychologists on job satisfaction (Findlay, Kalleberg, & Warhurst, 2013, p. 443). We try to combine these four indicators in a single study. However, our focus is not on job quality per se, but on determining the aggregate pattern of employment change—and on establishing as to whether this pattern varies according to whether occupations are considered as good or bad based on either one of these four indicators.

Our analysis of Germany, Spain, Sweden, and the United Kingdom combines microlevel data from three different sources. We rely on the

European Labor Force Surveys (EU-LFS) 1992–2015 to trace occupational change but impute information on job satisfaction from the European Social Survey (ESS) and on work income from the European Structure of Earnings Survey (SES).

Our article first discusses the theoretical arguments pleading for either occupational upgrading or polarization. It then reviews the concept of job quality and presents our data and analytical strategy. The Results section singles out the most strongly growing and declining occupations and then shows the pattern of change in the employment structure according to the four job quality indicators. The Conclusion section revisits the debate on job polarization.

The Theoretical Case for Upgrading

What theoretical reasons lead us to expect a scenario of occupational upgrading, understood as disproportionate employment growth in well-paid and highly skilled occupations at the expense of low-paid and less skilled occupations?

In the long run, change in the employment structure is driven by technology as workers are made redundant in occupations strongly affected by technological progress and switch to occupations for which technology has less influence or in which technology is complementary to workers' skills. Over the past decades, the former shrinking occupations were typically defined by tasks of low complexity that require modest skills such as the jobs of farmhands and manual manufacturing workers, supermarket vendors, and file clerks. In parallel, technological progress led to increasing labor demand for occupations defined by higher complexity and skill requirements such as computer scientists and engineers, lawyers and bankers, medical doctors and teachers. This upskilling of the employment structure came to be known in the 1990s as skill-biased technological change (Berman, Bound, & Machin, 1998) and was used to explain the widening gap in both wages and unemployment risks between low- and high-skilled workers (Acemoglu, 2002).

Over the past decades, the impact of technology on the employment structure was reinforced by globalization—notably by import competition from emerging economies and the offshoring of jobs in manufacturing and services to countries with lower wages. Research typically found low-skilled workers to be the group most vulnerable to displacement by international trade and foreign offshoring

(OECD, 2007, p. 129). Globalization thus seems to further tilt the occupational structure upward.

A third macrostructural trend that fostered occupational upgrading is educational expansion. Over the past 50 years, educational attainment has risen substantially for each ensuing cohort as schools, vocational colleges, and universities succeeded in reducing the share of workers with less than upper secondary education and in increasing the share of workers with tertiary education (OECD, 2011, p. 15). These shifts in skill supplies likely affect the pattern of occupational change—if firms choose their production techniques and create jobs not only on the basis of technology but also with regard to the available skills in a given labor market (Korpi & Tåhlin, 2009, p. 184). To the extent that the availability of high-skilled workers has risen steeply while that of midskilled workers has remained stable and that of low-skilled workers has plummeted, one would expect that the employment structure has upgraded. This seems all the more likely as unemployment rates have fallen for the growing group of the highly educated relative to the shrinking group of the lowly educated (OECD, 2012, p. 135).

The Theoretical Case for Polarization

What are the arguments that shattered the consensus view of occupational upgrading? The main theoretical impetus for polarization came from Autor, Levy, and Murnane (2003) who proposed a novel distinction between jobs consisting of either routine or nonroutine tasks. They argued that machines are not a good substitute for nonroutine tasks, be it abstract tasks requiring cognitive skills for decision-making and complex communication, or interpersonal service tasks requiring basic social perceptiveness and hand–eye coordination. While abstract tasks are typically done in professional or managerial jobs that require higher education, many interpersonal service tasks are at the reach of any individual with basic socialization.

By contrast, jobs mainly consisting of routine tasks can be taken over by technology. This applies to manual manufacturing jobs as well as clerical jobs in the back office. Computers may thus supplant for many production jobs as well as for the calculating and communicative functions of cashiers, telephone operators, and secretaries. This automation is seen as an important reversal because clerical jobs require a certain level of numeracy and literacy—and are thus not at the very bottom of the occupational hierarchy (Autor et al., 2003, p. 1284).

The spread of computer technology after 1990 is seen as having fostered job growth in high-end analytical occupations and low-end interpersonal service occupations while making routine jobs in manufacturing and the back office increasingly redundant. The theorists of polarization expect these routine occupations to be set in the middle of the skill and earnings distribution—although no clear explanation is advanced why routine jobs should cluster in the middle rather than the bottom of the skill and wage hierarchy.

A second argument in favor of polarization focuses on labor supply. It maintains that simply looking at average educational attainment ignores that recent migration flows were defined by a bimodal skill distribution (OECD, 2008, p. 83). Notably, the United Kingdom and the United States attracted not only high-skilled immigrants but also many lowly educated migrants from Eastern Europe (as the United Kingdom) and Central America (as the United States). Accordingly, two thirds of jobs created in the bottom tier of the American labor market during the 1990s were filled by Hispanic immigrants (Wright & Dwyer, 2003, p. 309). Similarly, immigration from Eastern Europe fueled job growth in low-end service jobs in the United Kingdom after the enlargement of the European Union in 2004 (Oesch, 2013, p. 96). Without a quickly growing pool of workers willing to fill these low-wage jobs, the labor market's bottom-end would not have expanded, and the scope for polarization would have been limited.

Despite these two arguments on routine tasks and immigration, the theoretical case for polarization requires some imagination. Polarization comes about only if employment in midskilled (routine) occupations declines faster than in low-skilled (nonroutine) occupations. This poses two problems. First, it is unclear which industries and occupations would propel massive creation of low-end jobs. Many of the traditional sources of low-skilled employment—be it in agriculture, along assembly lines, in sweatshops, filing archives, or behind cashier counters—have dried out or were offshored, and growth in personal care and domestic help seems insufficient to compensate for these losses. As a consequence, although rising educational attainment has strongly reduced the number of low-skilled workers, their unemployment rates relative to that of mid- and, above all, high-skilled workers have constantly risen over the 1990s and 2000s in Europe (OECD, 2012, p. 135).

A second problem relates to the expectation that occupations dominated by routine tasks are midskilled, whereas occupations composed of nonroutine tasks are low-skilled. This expectation seems unsupported by

European survey data: An important share of routine manual work is low-skilled (done by assemblers, machinists, cashiers, and file clerks), whereas an important share of nonroutine interpersonal service work is midskilled (done by social workers, childcare workers, or nursing assistants). Routine tasks and skills are thus not associated in the U-shaped way predicted by polarization but linearly as expected by skill-biased technological change: On average, the more routine tasks an occupation involves, the less complex it is and the lower its skill requirements are (Fernández-Macías & Hurley, 2017; Oesch & Rodriguez, 2011).

It is, of course, possible that many routine manual occupations require low skills but are midpaid. Jobs in routine production and the crafts tend to rank higher in terms of earnings than educational requirements, whereas occupations in personal and social services rank higher on education than earnings (Murphy & Oesch, 2016). The declining groups of manual production and craft workers may thus hold jobs that only require modest education, but as these jobs are set in capital-intensive workplaces with strong trade unions, they nonetheless offer midrange wages. This leads us to the question of how to measure job quality when analyzing the nature of occupational change over time.

Measuring Good and Bad Jobs

There is no clear consensus in the literature of what job quality is (Findlay, Warhurst, Keep, & Lloyd, 2017; Kalleberg, 2012). In economics, job quality tends to be equated with monetary rewards: Good jobs yield high earnings and bad jobs low earnings. While earnings may well be the most consequential—and most reliably measurable—indicator of an occupation's quality, it seems a stretch to consider them as synonymous with skills as economists commonly do.[1] The correlation between an occupation's skills and earnings is imperfect if earnings depend not only on skills and productivity but also on bargaining power and social norms (Bol & Weeden, 2015; Bosch & Weinkopf, 2017). Some low-skilled jobs such as car assemblers pay well, whereas some high-skill jobs are associated with modest earnings, typically teachers in some countries and U.S. states (Kalleberg, 2011, p. 114).

As a result, sociologists tend to privilege multidimensional indicators of job quality that also include nonmonetary measures. Muñoz de Bustillo Llorente et al. (2011) define job quality as "those attributes of work and employment that have a direct impact on workers' well-being" (p. 470). Following this definition, a bundle of job attributes

potentially matter to workers. Besides autonomy and control, five dimensions of job quality are commonly singled out: skill, work effort, personal discretion, pay, and security (Gallie, 2012; Green, 2006). Other authors emphasize the inherently personal dimension of what constitutes a good or bad job and thus argue that the quality of jobs should be evaluated with subjective indicators such as job satisfaction (Clark, 2005).

The decisive question is whether these different dimensions of job quality are positively correlated to each other. There are good theoretical reasons for such an assumption. Individuals with more human capital should not only be more productive but also command more labor market power and thus induce employers to offer them a more advantageous employment relationship (Goldthorpe, 2000). Likewise, segmentation theories expect the primary labor market to be made up of well-paying and secure jobs that are associated with promotion prospects, whereas the secondary labor market consists of low-paid and insecure jobs without opportunities for advancement (Kalleberg, 2011, p. 11).

However, earnings and other job amenities may also be correlated negatively—as expected by the theory of compensating differentials that still has some traction among orthodox economists. This theory was originally formulated by Adam Smith (1776/1811) who argued that "when the inconstancy of employment is combined with the hardship, disagreeableness and dirtiness of the work, it sometimes raises the wages of the most common labor above those of the most skillful artificers" (p. 73).[2] In this view, employers use one kind of benefit—typically earnings—to compensate for otherwise unpleasant working conditions in jobs such as oil rig workers, coal miners, or undertakers.

Empirically, the theory of compensating differentials has not fared well. Earnings tend to correlate positively with a large set of job quality indicators and notably with job satisfaction (Clark, 1996). The conclusion from a large overview is that the argument of compensating differentials does not hold "except in some extreme cases involving very serious health risks" (Muñoz de Bustillo Llorente et al., 2011, p. 449).

Our Indicators of Job Quality

The focus of our study does not lie on job quality *per se*, but on occupational change. However, the analysis of occupational change depends on a reliable indicator of job quality. Only by distinguishing between more or less advantageous jobs can changes in the employment structure be interpreted as upgrading, downgrading, or polarization.

Our study thus compares the pattern of occupational change by using four indicators of job quality.

The first indicator is earnings. The employment relationship, in essence, boils down to an exchange of work effort for economic rewards (Rose, 2003, p. 506). Moreover, earnings have the advantage of being commonly recorded in surveys and can thus be reliably measured.

A second indicator concerns the skill requirements of a job. Because this indicator is difficult to measure, earlier studies have used the mean level of education that workers hold in a given occupation (Fernández-Macías, 2012, p. 9; Oesch, 2013, p. 48). The idea is that workers' education serves as a proxy for the skill requirements in a given job.

A third indicator refers to prestige and the social evaluation ascribed by people to different occupations (Treiman, 1976). Prestige is a measure of an occupation's social desirability and thus taps into symbolic rather than economic power. Some occupations may score low in terms of material conditions but be prestigious (say writers), whereas others pay well but may receive less public recognition (say real estate agents).

Our fourth indicator is job satisfaction and reflects the personal evaluation of how good or bad a job is. Job satisfaction has the advantage that it is not the researcher who decides whether a job is good or bad, but the workers themselves provide an evaluation of their job's quality (Dahl, Nesheim, & Olsen, 2009, p. 10).

Data and Analytical Strategy

Data

We examine whether the findings of occupational upgrading or polarization hold across different institutional contexts. We thus select four European countries that cover a broad range of institutional variety and come close to Esping-Andersen's (1999) ideal-typical welfare regimes: Germany as a conservative Continental regime, Spain as a conservative Mediterranean, Sweden as a social-democratic Nordic, and the United Kingdom as a liberal Anglo-Saxon welfare regime. While these countries have different traditions of state involvement in collective bargaining and wage setting (Bosch & Weinkopf, 2017) and differ in the extent of precarious work (Mai, 2017, p. 290), their employment structures are exposed to similar influences stemming from technological change and globalization. Moreover, with more than 200 million residents, the four countries combined comprise close to half of the European Union's total population.

We use individual-level data from three different sources. We rely on the EU-LFS to trace change in the employment structure from 1992 to 2015 for Germany, Spain, and the United Kingdom and, because of shorter availability of occupational codes, from 1997 to 2015 for Sweden. The EU-LFS contains information on occupations and education but not on job satisfaction and (before 2011) earnings. We thus impute, for each occupation, median earnings from the European SES in 2002 (2006 for Germany)[3] and job satisfaction from the ESS, merging the three rounds (2006, 2010, and 2012) that include a question about job satisfaction.

We include in our analytical sample all workers ages 20 to 64 who spend at least 20 hours per week in gainful employment, as employees, employers, or self-employed. We thus exclude only workers with a marginal attachment to the labor market such as teenagers, senior workers, and small part timers. For Germany, where growth of mini-jobs has been an important feature since their introduction in the early 2000s, we run a robustness check by including all jobs of at least 8 hours per week (one work day per week).

Our goal is to use as encompassing a definition of the workforce as possible. Therefore, unlike much research on occupational change in economics, we also include agricultural workers, civil servants, women, migrants, or the self-employed. The employment shares of these frequently excluded categories are not constant over time but have strongly declined (as for agricultural and self-employed jobs) or increased over the past decades (as for jobs held by migrants, women, or civil servants; Oesch, 2013). Our definition leaves us with large analytical samples of between 13,002 (Sweden in 1997) and 264,266 observations (Germany in 2015).[4]

Measures

Our analysis of change in the employment structure relies on occupational information at the most detailed level available in the EU-LFS, International Standard Classification of Occupations (ISCO)-1988 at the three-digit level. Because we impute information on earnings and job satisfaction from two different datasets than EU-LFS, we need to adapt our occupational variable for the analysis using earnings and job satisfaction.[5] Table A1 in the Appendix shows the number of occupations that we distinguish for each of our four occupational rankings.

Eurostat shifted in 2011 from ISCO-1988 to the new classification of occupations ISCO-2008. We use Harry Ganzeboom's crosswalk to

recode occupations from ISCO-2008 to ISCO-1988.[6] As different occupational classifications can never be totally harmonized by back-coding, we present the pattern of occupational change for three subperiods (1992–2000, 2000–2008, and 2008–2015), knowing that only the last subperiod is affected by the break in the occupational coding. Moreover, as a robustness test, we also present the result of occupational change if occupations are harmonized the other way around, from ISCO-1988 to ISCO-2008.

The measurement of our four indicators of job quality is straightforward. First, we rank order occupations based on their *median gross hourly work income*. Second, we calculate *average education* by distinguishing five hierarchically ordered levels: (a) primary education, (b) lower secondary, (c) upper secondary, (d) first stage of tertiary, and (e) second stage of tertiary education. Occupations are then rank ordered based on their mean educational attainment taken from EU-LFS 1998 (for Spain and Sweden) or 1999 (for Germany and the United Kingdom).

Third, we attribute a *prestige* score to each occupation based on Treiman's (1976) Standard International Occupational Prestige Scale. As a robustness check, we replicate these results with an alternative (and newer) measure of social status and use the International Socio-Economic Index of Occupational Status (ISEI) developed by Ganzeboom and Treiman (1996). The results for occupations rank ordered by ISEI lead to the same conclusions for occupational change (see Figure A2 in the online Appendix).

Fourth, we use the question on job satisfaction in the ESS ("How satisfied are you in your main job?" with answers from 0 *extremely dissatisfied* to 10 *extremely satisfied*) to rank order occupations on the basis of the proportion of workers reporting a value of job satisfaction above the median job satisfaction in a given country.

We briefly look at the correlation between the four occupational rankings of job quality (see Table A2 in the Appendix). The Spearman rank correlations suggest that the occupational hierarchy based on education and prestige is closely linked. In all four countries, these two indicators tap into the same underlying dimension of job quality. Correlations also tend to be positive between these two indicators and occupations sorted on the basis of earnings, but they are much weaker. The rank correlations are lowest with job satisfaction. Except in Germany, occupations with higher job satisfaction seem to be neither more prestigious nor having higher levels of education or earnings.

Analytical Strategy

We examine change in the employment structure by adopting the analytical strategy of job quality quintiles (Wright & Dwyer, 2003). Its building blocks are occupations that are rank ordered, in turn, on the basis of these four indicators: earnings, education, prestige, and job satisfaction. These rank-ordered occupations are then grouped into five job quality quintiles, Quintile 1 comprising the least advantageous and Quintile 5 the most advantageous occupations. Each quintile comprises 20% of total employment *at the beginning of the period under study*, thereby allowing us to calculate occupational change over time by tracing employment changes in each of the five quintiles.

We would argue that this analytical strategy is a clear improvement over earlier studies such as OECD (2017, p. 86) or Goos et al. (2009, 2014) which simply distinguish three occupational groups: high-skilled occupations include ISCO Major Groups 1, 2, and 3; middle-skilled occupations Major Groups 4, 7, and 8; and low-skilled occupations Major Groups 5 and 9. This procedure ignores the construction logic at the basis of ISCO which combines in Major Groups 4 to 8 occupations that are set at the *same* "second" skill level as opposed to ISCO Group 9 (elementary occupations set at the first skill level; Elias, 1997, p. 7). It is unclear why service and sales workers (ISCO Group 5) should be less skilled than either craft workers (ISCO Group 7) or machine operators and assemblers (ISCO Group 8). Moreover, it seems problematic to exclude ISCO Group 6 (agricultural workers) from an analysis of overall change in the employment structure. In terms of jobs, this category was anything but constant over the past few decades. Finally, the three skill groups do not correspond to employment tertiles but are of highly uneven size. For a methodological critique of the polarization result by Goos et al. (2009) that extends to OECD (2017), see Fernández-Macías (2012).

A potential concern of our analysis is that it leaves out unemployment. Change in the occupational structure refers only to jobs and is thus computed only for individuals who work in paid employment in a given occupation. In practical terms, this is not a major issue for our analysis as the unemployment rates were comparable in the early 1990s and the mid-2010s within the four countries under study, with a slight decrease in Germany, the United Kingdom, and Sweden, and an increase in Spain. Overall, our study leaves out, in each country, a similar proportion of unemployed individuals at the beginning and the end of our analysis.[7]

Another concern of our method is that it assumes a country's occupational ranking by earnings, education, or the other indicators to have remained constant between the 1990s and the 2010s. A large literature review concludes that occupational hierarchies are stable across nations and over time in terms of earnings, education, and prestige (Hout & DiPrete, 2006, p. 3). Empirical studies also suggest that there is considerable stability in the occupational earnings structure over time. Occupations that are high-paid (low-paid) jobs in one decade were still high-paid (low-paid) one to two decades later. Medical doctors, lawyers, and business professionals were always at the top, farmhands, cleaners, and textile workers at the bottom of the occupational hierarchy (Goos & Manning, 2007, p. 122; Lambert, Tan, Prandy, Gayle, & Bergman, 2008, p. 189; Wright & Dwyer, 2003, Appendix).

We further examine this assumption for education, the indicator for which we have the longest series in our data. We plot the relative education of occupations in 1998/1999 against their relative education in 2013 and find for all four countries Spearman rank correlations that are consistently high (0.83 in Sweden, 0.88 in Germany, 0.93 in the United Kingdom, and 0.96 in Spain). These results suggest that occupations with the highest (lowest) education in 1998 were also the occupations with the highest (lowest) education 15 years later (see Figure A1 in the online Appendix).

The Pattern of Occupational Change

We provide a first idea of the pattern of occupational change by singling out the five occupations with largest absolute job growth over the period under study. In all four countries, corporate managers in the private sector make the list of the top five (see Table A3 in the Appendix). This is also the case for business professionals everywhere except in Spain, and for life science and health (associate) professionals in Germany and Sweden. The shortlist of the most strongly growing occupations includes not only high-end jobs but also more menial occupations such as domestic helpers, cleaners, and launderers (in Germany and Spain) as well as personal care workers (in Spain and the United Kingdom). By contrast, the occupations with the largest employment loss over the past two decades mainly include low- and semiskilled production jobs such as plant operators, assemblers, and builders on the one hand and office clerks and sales assistants on the other.

Our main focus lies on the overall change in the employment structure and thus on Figure 1(a) to (d). They show a strikingly similar

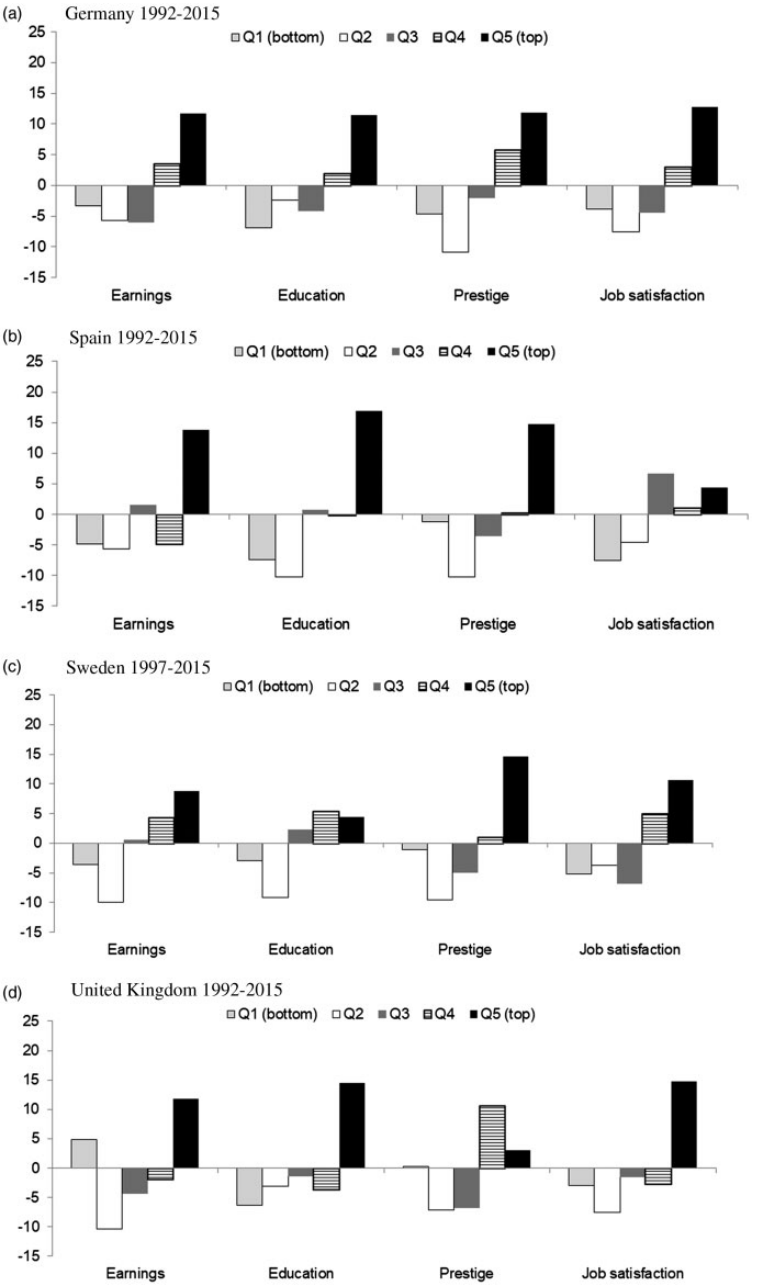

Figure 1. Employment change across job quality quintiles (in percentage points).

pattern of occupational upgrading. Regardless of the indicator used, job growth was strongest, in all four countries, in the occupations of Quintile 5 where job quality is highest. The proportion of employment in these top-end occupations increased by roughly 10 percentage points—from 20% at the beginning of the 1990s to about 30% in 2015. In parallel, the employment share of the three bottom quintiles declined each by 3 to 5 percentage points. As a result, the predominant trend in the employment structure was not job polarization and the hollowing out of the middle, but occupational upgrading. The use of different job quality indicators leads to the same conclusion and our substantial findings remain unchanged regardless whether job quality is measured with earnings, education, prestige, or job satisfaction.

In Germany, regardless of the job quality indicator taken, job growth was by far strongest in the top Quintile 5, followed by Quintile 4. To the extent that employment tended to decline somewhat more in the middle than the bottom quintile, upgrading may have been accompanied by a mild polarization of the occupational structure. The results for Germany remain unchanged if we enlarge the analytical sample to all jobs of at least 8 hours per week and thus also include mini-jobs (see Figure A3 in the online Appendix).

The thrust toward upgrading is also clear-cut in Sweden and Spain. In Sweden, employment expanded most, by far, in the top Quintile 5, regardless of the indicator taken. The same applies to Spain where the extent of structural change was particularly impressive. The employment share in Quintile 5 almost doubled, expanding by 15 percentage points, when job quality is measured with earnings, education, or prestige. This finding echoes the results by Garrido and Rodriguez Rojo (2011, p. 50) who show with the Spanish labor force survey 2000–2010 that much more employment was created in occupations with high education than in occupations with medium and low education.

The results are not as straightforward for the United Kingdom. As in the other three countries, job growth was largest in the Quintile 5. Yet if occupations are sorted on the basis of their median earnings, employment expanded both in the top and bottom quintile, thereby leading to polarization. By contrast, the polarization thesis does not hold if job quality is measured with education. In this case, employment in the bottom quintile fell, and we observe upgrading.

A few occupations explain this difference in the United Kingdom. Most central is the strongly growing occupational group of personal care workers. While it is among the lowest-paid occupations (Wage Quintile 1), it is not among the least educated ones (Educational

Quintile 2). The opposite scenario applies to material recording and transport clerks who witnessed strong job decline over the past decades. This shrinking occupation requires only modest education (Educational Quintile 1) but is not among the least paid ones (Wage Quintile 2).

Occupational Change Over Subperiods

The thesis of routine-biased technological change expects polarization to gather speed with the spread of computer technology across workplaces (Autor et al., 2008, p. 318). This trend may be hidden by our analysis that covers more than 20 years. We thus examine period effects and calculate occupational change for three subperiods of roughly 8 years: 1992–2000, 2000–2008, and 2008–2015. Figure 2(a) to (d) shows the results for the job quality quintiles using earnings and education to rank order occupations. At the beginning of each subperiod, occupations are reallocated into the five quintiles so that each quintile comprises again 20% of total employment at the outset.

These analyses suggest that the occupational structure consistently upgraded over the 1990s and 2000s. In Germany, Spain, and Sweden, job growth was largest in Quintile 5 in every subperiod according to (almost) every job quality indicator. Occupational upgrading is particularly evident for Sweden in the period between 2008 and 2015.

Results are again less straightforward for the United Kingdom where we do observe disproportionate job growth not only in the top Quintile 5 but also in Quintiles 4 and 1. When taking earnings as job quality indicator, we find that the employment structure in the United Kingdom polarized in the 1990s and early 2000s. In contrast, the last subperiod from 2008 to 2015 was defined by strong upgrading.

In all four countries, the employment shifts across quintiles tend to be largest in the last subperiod, with a large job decrease in the bottom-end occupations of Quintiles 1 and 2. These shifts may be due to the disproportionate job losses during the Great Recession. The last subperiod also coincides with strong employment decline in the middle quintile in Spain where the number of construction jobs plummeted after the housing bubble burst. However, these shifts in the last subperiod could also be artificially inflated by the break in the occupational classification from ISCO-88 to ISCO-08 (although we use a crosswalk between the two classifications).

In a robustness test, we examine whether our results are distorted by the break in the occupational classification and harmonize the occupational data on the basis of ISCO-08 (rather than ISCO-88). When

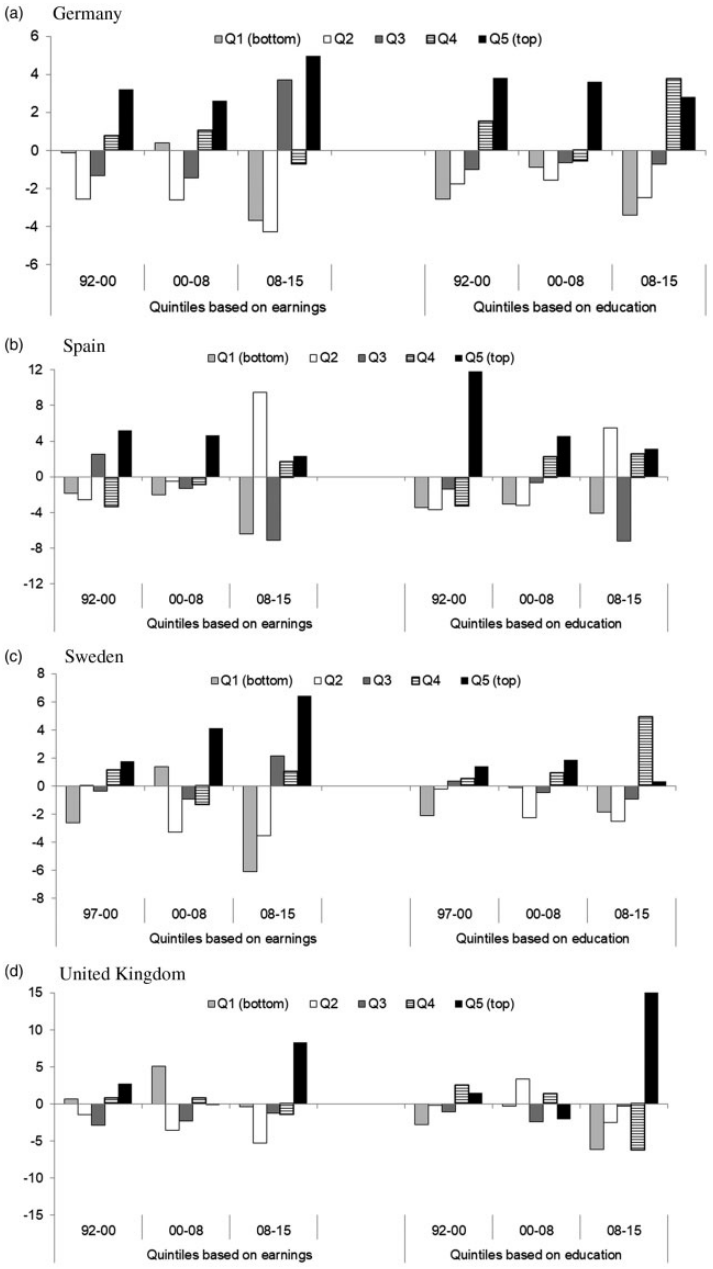

Figure 2. Employment change across quintiles by subperiod (in percentage points).

replicating the analysis of overall occupational change with ISCO-08 (using education as job quality indicator), we find the same pattern of upgrading (see Figures A4(a) to A7(a) in the online Appendix). Likewise, when replicating the same analysis with a linear measure of education, rank ordering occupations on the basis of years instead of levels of education, we obtain the same result of occupational upgrading (see Figures A4(b) to A7(b) in the online Appendix).

Employment Shifts in the Class Structure

Some readers may be skeptical about the substantive meaning of job quality quintiles. In a last analysis, we therefore use a more intuitive method of depicting the pattern of occupational change by examining shifts in the class structure. Social class is a shortcut for the resources obtained and the constraints faced in different occupations, and thus serves as a proxy for the life chances that working in a given occupation entails (Goldthorpe, 2000).

We use a class schema based on two dimensions: a *vertical dimension* of more or less advantageous employment relationships and a *horizontal dimension* of different work logics (Oesch, 2006). The combination of the two dimensions provides us with eight classes (see Table 1). Three classes belong to the salaried middle class: (associate) managers, technical specialists, and sociocultural (semi-)professionals. Two classes form the working class: production workers and service workers, with a third class—office clerks—situated in the twilight zone between the middle and working class. Finally, two classes are composed of the self-employed: large employers and liberal professionals on one hand and small business owners on the other.[8]

Table 1 shows how the class structure evolved between 1992 and 2015. It points to an upward shift in the occupational system that was primarily driven by job growth within the salaried middle class, first and foremost among managers and associate managers. Between the 1990s and 2015, the employment share of the managerial class—defined largely—increased by at least 9 percentage points in all four countries studied. We also observe consistent employment expansion among technical professionals and semiprofessionals (such as IT-professionals, engineers, or technicians) as well as among sociocultural professionals and semiprofessionals (such as medical doctors, teachers, or social workers).

In contrast, two occupational classes saw their proportion of total employment substantially drop over the past two decades: production workers and office clerks. Between the 1990s and 2015, production

Table 1. Evolution of Employment Across Social Classes (in % of Total Employment), 1992–2015.

	Interpersonal service logic	Technical work logic	Organizational work logic	Independent work logic
	Sociocultural (semi-) professionals	Technical (semi-) professionals	(Associate) managers	Liberal professionals and large employers
	Medical doctors Teachers	IT professionals Technicians	Business professionals Financial managers	Entrepreneurs Self-employed lawyers
DE	10 → 12	9 → 10	13 → 24	2 → 4
ES	7 → 11	2 → 7	4 → 15	2 → 3
SW	15 → 15	9 → 12	14 → 23	1 → 3
UK	11 → 11	6 → 9	18 → 27	3 → 4
	Interpersonal service workers Nursing assistants Waiters	Production workers Carpenters Assemblers	Office clerks Secretaries Receptionists	Small business owners Shop owners Farmers
DE	15 → 10	32 → 21	14 → 13	7 → 6
ES	21 → 21	31 → 20	12 → 9	21 → 13
SW	21 → 20	20 → 15	11 → 7	6 → 6
UK	15 → 16	21 → 12	16 → 10	10 → 10

Note. The period under study is 1997–2015 for Sweden. DE = Germany; ES = Spain; SW = Sweden; UK = United Kingdom.
Reading example: In Germany, sociocultural (semi-) professionals comprised 10% of total employment in 1992 and 12% in 2015.

workers went from more than 30% to 20% of the workforce in Germany and Spain and from 20% to less than 15% in Sweden and the United Kingdom. The decline in office clerks' employment share was smaller, but observable in all four countries.

Finally, the proportion of employment remained constant over time in two other classes: among small business owners (except in Spain where it strongly decreased) and interpersonal service workers (except in Germany where it declined). The stability among interpersonal service workers is critical as the employment structure in postindustrial economies will polarize only if there is a sizeable expansion in low-end interpersonal service jobs—an expansion that did not seem to have taken place.

Discussion

Our analysis of occupational change in four European countries provides no support for the polarization thesis. On the contrary, over the past two decades, employment expanded more in the advantageous occupations of the *sole* top Quintile 5 alone than in the less advantageous occupations of the three bottom Quintiles 1 to 3 *combined*—no matter whether advantage refers to material or immaterial, objective or subjective dimensions of job quality.

This finding holds across different subperiods. Between 1992 and 2015, job growth tended to be strongest in the top quintile in every subperiod. This suggests that occupational upgrading in Europe was a long-term structural trend that did not fundamentally vary over the business cycle—a point also made by Manning (2003, p. 329).

There is not only a basic similarity in the pattern of occupational change over subperiods, but also across countries. The shifts in the employment structure look very much alike in Germany, Spain, and Sweden and show upgrading. Results are less straightforward for the United Kingdom. When taking earnings as job quality indicator, we find that the employment structure in the United Kingdom polarized in the 1990s and early 2000s as shown by earlier studies (Goos & Manning, 2007; Holmes & Mayhew, 2012). By contrast, if we rank order occupations based on education, prestige, or job satisfaction, the results point to upgrading of the occupational system over the past two decades.

In all four countries, upgrading was the result of strong job growth in Quintile 5. This is the key shift in the occupational structure which

has been driving employment change since the early 1990s. Translated into social classes, this means that labor market opportunities expanded for the salaried (upper) middle class, whereas the core of the traditional working class and subordinate white-collar employees lost ground. For the polarization thesis to hold, we should also have observed job growth in low-skilled services, among interpersonal service workers. However, this mostly female class did not substantially increase its employment share in any of the countries under study.

Conclusion

This article critically assessed the polarization thesis and, in light of the empirical findings, rejects it for the past two decades in Western Europe. Advanced economies continue to be most successful in the automation and offshoring of low-paid, low-skilled, and low-status occupations such as farm workers and plant operators, data-entry clerks and sales assistants. In parallel, job expansion was most vigorous in the occupations of the top quintile, among higher paid and better skilled positions in management and the professions. These findings strongly suggest that technological change continues to be skill-biased, reducing demand for jobs that require little in terms of qualifications and increasing demand for jobs that are skill-intensive.

Contrary to the argument of compensating differentials, patterns of occupational change do not vary substantially if job quality is measured with prestige, job satisfaction, or education instead of earnings. For the study of occupational change, the common use of earnings to rank order occupations seems to give valid results. Wages do not compensate for otherwise unpleasant working conditions but appear to be part of a (positively correlated) bundle of monetary and nonmonetary rewards that make a job more or less attractive. On the other hand, our analysis also shows that earnings could be replaced, in the study of occupational change, by the more commonly available information on educational attainment in a given occupation.

The doom scenario of polarization and middle class erosion may catch the newspapers' headlines, but it does not reflect the structural trends in Western Europe's employment structure. Given the extent of educational expansion over the past few decades, this is good news. As technical colleges and universities were sending out highly educated workers in greater numbers—and less qualified older cohorts went into retirement—the economy was also creating more jobs in occupations requiring higher education.

What are the policy implications of these results? The race between education and technology (Tinbergen, 1975) will go on in the near future. While demand for low-skilled work will by no means dry up entirely, the job opportunities for workers with low qualifications will continue to shrink. To fully harness the potential of technological change for the labor market, state action will be needed at both ends of the labor market. At the upper end, public investment into tertiary education allows firms to hire highly qualified workers in sufficient numbers and thus to take full advantage of technological progress. At the lower end, a strengthening of both upper secondary schooling and vocational education helps to reduce the numbers of workers with low qualifications. By additionally pursuing an ambitious minimum wage policy, governments can incite firms to invest into their workers' productivity through upskilling rather than to rely on a stagnant low-wage sector. The result may then be an ongoing process of inclusive occupational upgrading.

Appendix

Table A1. The Number of Occupations Distinguished for Each Occupational Ranking.

	Earnings	Education	Prestige	Job satisfaction
Germany	24	109	119	49
Spain	25	108	119	47
Sweden	104	87	119	46
UK	96	101	119	42

Note. UK = United Kingdom.

Table A2. Correlation of Occupational Rankings Based on Different Job Quality Indicators.

	Germany	Spain	Sweden	UK
Earnings—education	0.14	–0.09	**0.65**	**0.79**
	(0.51)	(0.70)	(0.00)	(0.00)
Earnings—prestige	0.37	**0.44**	**0.79**	**0.78**
	(0.08)	(0.04)	(0.00)	(0.00)

(continued)

Table A2. Continued

	Germany	Spain	Sweden	UK
Earnings—job satisfaction	0.36	0.28	**–0.50**	–0.07
	(0.09)	(0.21)	(0.00)	(0.65)
Education—prestige	**0.91**	**0.81**	**0.85**	**0.89**
	(0.00)	(0.00)	(0.00)	(0.00)
Education—job satisfaction	**0.31**	**–0.46**	**–0.53**	–0.21
	(0.03)	(0.00)	(0.00)	(0.19)
Prestige—job satisfaction	**0.33**	**–0.29**	**–0.56**	–0.28
	(0.02)	(0.05)	(0.00)	(0.08)

Note. *p* values in parenthesis; bold coefficients: $p < .05$.
Earnings are measured in 2002 (except Germany: 2006); education and prestige are measured in 1999 (except Spain and Sweden: education in 1998); job satisfaction is measured in 2006. UK = United Kingdom.

Table A3. The Five Occupations With Largest Absolute Job Growth and Decline.

Country		% in 1992	% in 2015
	Most strongly *growing* occupations		
Germany	Corporate managers (private sector)	3.6	8.6
1992–2015	Life science and health associate professionals	1.0	3.7
	Business professionals	0.7	3.1
	General managers (public sector)	1.8	3.9
	Domestic helpers, cleaners, and launderers	2.1	3.9
Spain	Customer services clerks	1.7	5.9
1992–2015	Corporate managers (private sector)	7.0	10.1
	Restaurant services workers	3.6	6.3
	Personal care and related workers	1.4	3.9
	Domestic helpers, cleaners, and launderers	5.0	7.0
Sweden	Corporate managers (private sector)	2.8	7.0
1997–2015	Business professionals	2.1	5.4
	Primary and preprimary education teachers	1.8	4.7
	Life science and nursing professionals	1.1	3.0
	Associate business, tax, government professionals	1.9	3.6
United Kingdom	Business professionals	1.1	6.4
1992–2015	Personal care and related workers	2.9	7.3
	Corporate managers (private sector)	8.4	11.6
	Finance and administrative associate professionals	3.0	6.1

(continued)

Table A3. Continued

Country		% in 1992	% in 2015
	Computing and hard science professionals	1.5	3.1
	Most strongly *declining* occupations		
Germany	Miners, builders, and painters	3.8	1.9
1992–2015	Craft workers, miscellaneous	3.2	1.3
	Building finisher trade workers	3.8	1.3
	Metal, machinery, and related trades workers	7.2	4.7
	Salespersons	4.6	0.3
Spain	Farmers (crops and garden)	4.3	1.8
1992–2015	Precision and printing craft workers	5.3	2.6
	Plant operators and assemblers	6.0	3.2
	Salespersons	5.0	0.8
	Secretaries and mail clerks	8.1	0.5
Sweden	Building finisher workers	2.8	1.2
1997–2015	Teaching associate professionals	2.4	0.0
	Salespersons	4.3	0.7
	Plant operators and assemblers	7.2	3.0
	Secretaries and mail clerks	6.2	0.9
United Kingdom	Precision and printing craft workers	3.1	1.2
1992–2015	Machine operators and assemblers	4.0	1.6
	Library, mail, and office clerks	8.8	4.9
	Salespersons	5.3	0.9
	Secretaries and transport clerks	5.4	0.7

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. An example is David Autor and David Dorn (2013) who label the job quality dimension "skill percentile (ranked by 1980 occupational mean wage)" (p. 1554).
2. Adam Smith (1776/1811) then gives the following example: "A collier working by the piece is supposed, at Newcastle, to earn commonly about double, and in many parts of Scotland about three times the wages of common labor. His high wages arise altogether from the hardship, disagreeableness, and dirtiness of his work." (p. 73)
3. Note that the SES does not include small firms with less than 10 employees nor the sector of agriculture. While there is no reason why the absence of small firms should systematically change the earnings hierarchy of occupations, the absence of agriculture would be more problematic if the SES had not such large sample sizes. We are able to rank order agricultural workers (ISCO-1988 codes 611 to 615) because a sizeable number of them work in other sectors, notably in construction (gardening and landscaping) and manufacturing (food industry). Accordingly, the number of earnings observations provided by the SES for agricultural workers (ISCO Group 6) ranges between a minimum of $N = 151$ (United Kingdom 2002) and a maximum of $N = 487$ (Sweden 2002).
4. The number of observations in our analytical sample of the EU-LFS is as follows: Germany: 198,002 (1992) and 264,266 (2015); Spain: 111,621 (1992) and 60,940 (2015); Sweden: 13,002 (1997) and 172,668 (2015); United Kingdom: 85,200 (1992) and 41,637 (2015). While the samples used for calculating earnings in the SES are large, exceeding 100,000 individuals for each country, our samples for calculating job satisfaction in the ESS are smaller and include about 1,000 observations per year and country, prompting us to merge the three ESS rounds with questions on job satisfaction.
5. As the SES records occupations for Germany and Spain only at the ISCO two-digit level, we use a less detailed measure of occupation for the earnings-based analysis of these two countries. Likewise, despite merging three

rounds, the ESS has too few observations in some occupations to provide us with reliable measures of job satisfaction. We thus cross occupational information based on ISCO-3 digit (for larger occupations) and ISCO-2 digit (for a few small occupations) with information on the economic sector, distinguishing between manufacturing, private services, and public services. This allows us to base our rank ordering of occupations on at least 20 observations of job satisfaction per occupation in each country.

6. Most of our surveys had originally coded occupations with ISCO-1988. By transforming ISCO-2008 into ISCO-1988 codes, we are able to keep as many original occupational codes as possible. The codes used for the crosswalk were downloaded from www.harryganzeboom.nl/isco08/isco08.zip (retrieved in March 2017).
7. The unemployment rate was higher in 1992 than 2015 in Germany (6.6% vs. 4.6%) and the United Kingdom (9.7% vs. 5.6%) as well as Sweden in 1997 than 2015 (10.2% vs. 7.4%). However, it was lower in Spain in 1992 than 2015 (18.5% vs. 22.1%; OECD online database).
8. Three sets of information are used to construct the class variable: employment status (separating employers and the self-employed from employees), the number of employees (separating large employers with nine and more employees from small business owners with zero to eight employees), and, most importantly, detailed occupation (based on ISCO three-digit). For more detail on the concept and measurement of the class variable, see Oesch (2006, pp. 270–272). The script used for the construction of this class schema is available from Daniel Oesch's website: http://people.unil.ch/danieloesch/scripts/

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