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Labour-market polarisation and elementary occupations in Europe

Blip or long-term trend?

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CEDEFOP

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The **European Centre for the Development of Vocational Training** (Cedefop) is the European Union's reference centre for vocational education and training. We provide information on and analyses of vocational education and training systems, policies, research and practice.
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‘In the “caste system”, professions or occupations were strictly separated from each other. At the top were the priests, or Brahmins. They were in charge of sacred knowledge. [...] A tiny part of the population was excluded from any caste. They were pariahs, people who were given the dirtiest and most unpleasant tasks. So they became known as the “untouchables”. They had to make sure that their shadow never touched another person, because even that was thought to be defiling. People can be very cruel.’ (Gombrich, 2005)

Foreword

European challenges are essentially driven by technological change, globalisation pressures and socio-demographic developments. Structural changes can open new opportunities but also expose workers and firms to rapidly evolving knowledge, skills and competence needs. During the 2000s, such a process took place under relatively favourable conditions. In 2008, when the recession interrupted a long period of increasing employment, there were about 20 million new employees in Europe compared to the previous decade. The international crisis dramatically changed the picture. Millions of jobs have been lost during the last two years; net employment growth will probably remain low in the next decade as a result of the economic downturn. Against this background, better understanding of developments and changes in occupational and labour skill structure is perhaps more important than in the past.

To address these issues, the European Commission put forward a major initiative of establishing a regular assessment of long-term labour-market trends. This anticipates future skills needs for workers and employers in the EU. Within the New skills for new jobs initiative and the Europe 2020 flagship, *An agenda for new skills and jobs*, Cedefop produces forecast analyses integrating labour demand and supply and evaluates their possible impact on qualifications and occupational structure. The results confirm a further increase in the supply of both medium-qualified and, especially, highly-qualified people in the workforce and employment. Consistently, a sharp increase in highly-skilled occupations is expected. However, Cedefop's forecast also highlights a possible simultaneous growth in the demand for elementary occupations, which are usually considered to require limited education and training.

This paper focuses on changes in the occupational structure of employment, with particular attention given to the lower end of the occupational skill distribution. For the first time, at least since 1970, and arguably even before, during the decade 1998-2008 'occupational polarisation' emerged across Europe, with a concomitant rising demand at the upper and lower ends of the occupational skill distribution. Several important and policy-relevant questions emerge: how should we interpret this phenomenon; is it bound to persist; why are people with higher qualifications increasingly employed in elementary occupations; are there particular groups which are more affected than others; should we attribute these trends to technological and/or task content changes occurring within sectors?

The aim of this study is to provide some first answers to these questions. The main insight is that some socio-demographic and institutional factors – such as ageing, migration flows or labour-market institutions and policies – could have played a significant role. However, the work presented in this research must be

considered as a first step towards a full understanding of polarisation and its causes. Occupational polarisation trends are diversified across countries and sectors and would require tailored policy responses. For this reason, further and more structured analyses are needed to distinguish the different patterns across EU Member States, sectors and occupations, and assign a specific magnitude to the different possible causes. When addressing elementary occupations – which involve both workers and employers, often marginal to the labour market – a more qualitative and institutionally oriented approach could support better understanding of polarisation in Europe.

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Executive summary

Labour market polarisation is not new. There is growing literature providing evidence (particularly from the US and the UK) of an overall increase in demand for low- and high-paid jobs, while people working in the middle of the wage spectrum tend to decline. The 'task-approach' to the skill biased technological change hypothesis seems to provide a good explanation for this trend. By lowering the opportunity-cost of capital, technological progress tends to substitute labour performing routine tasks, which generally occupy the middle of the wage ranking. Jobs at the top and the bottom of the spectrum (both abstract and manual non-routine tasks) are often complementary with technological progress. The labour market tends to become polarised, with an increasing number of workers at the extremes of the spectrum and fewer in the middle.

In this paper, particular attention is given to elementary occupations. The primary aim of the research is to describe and analyse European employment trends by occupation and provide evidence of emerging structural growth in elementary occupations and, thereby, of polarisation. The main results of the analysis can be summarised as follows.

Is it possible to identify a clear increasing trend in labour demand for elementary occupations?

Even though the recent economic crisis partially changed the picture, occupational polarisation has emerged across Europe since the end of the 1990s. The share of knowledge- and skill-intensive occupations reached 38.6% in 2008 and continued to increase during the crisis. At the same time, elementary occupations increased in number and in share of total occupations, and showed the highest growth rate together with high-skilled occupations. The number of workers in elementary occupations rose by almost 3.9 million between 2000 and 2008, contributing 20% to the overall growth in employment, and showing a growth rate of 22% compared to an average of 10%. So, the share of elementary occupation in total employment increased from 8.7% in 2000 to 9.6% in 2008.

What differences can be observed across countries and sectors?

The recent growth in share of elementary occupations in Europe differs across countries, sectors and among specific occupations within elementary occupations. Most of the growth is in tertiary activities, mainly in 'household and business services', whereas 'manufacturing and utilities' show strong negative trends. Further, 'private household' emerges as the unique growing sector where polarisation occurred during the decade. Consistent with these trends, 'sales and service' is the most substantial and dynamic sub-major group. This set of professions is usually considered to require limited education and training: street or door-to-door sales or services, cleaning services, property watching and caretaking, delivering goods and messages or carrying luggage.

To what extent can observed changes in occupations be attributed to technological factors and/or task content changes within sectors?

Our analysis shows that the growth of elementary occupations is largely due to structural changes in inter-sectoral composition rather than in production methods. Using a shift-share approach, we decompose cross-sectoral differences in occupational structure within sector (structural effect) and between sectors (occupational skill effect). This analysis shows that polarisation has been largely determined by the structural changes which occurred in Europe during 2000-08, while the role of technological and/or work content changes within sectors has generally been weaker and more uncertain. Only for 'technician and associate professionals' can a predominance of an occupation-specific effect be highlighted. Although elementary occupations appear among the groups that show positive effects for both sectoral composition and occupational intensity, only a minor part of the growth of elementary occupations can be ascribed to changes within individual sectors.

How should we interpret the emergence of rising demand at the upper and lower ends of the occupational structure?

The observed trends do not exclude a role for a 'technological-task' explanation to polarisation, with some low non-routine jobs that – unlike medium-routine jobs – are not displaced by new technologies. However, the drivers of the phenomenon are

many and varied. With reference to the European context, we are not aware of literature developing a comprehensive approach to disentangling the effects and to assigning a specific magnitude to the different causes. The wage-structure approach is difficult to apply to European countries for theoretical reasons and scarcity of data, particularly when approaching polarisation in terms of occupations rather than low- and high-paid jobs. The observed trends can also, be associated with changes in inter-sector productivity, globalisation, international division of labour, and demand trends, whether brought about by general growth, socio-demographic changes or by some alteration in consumption models of the population.

Does the increasing labour supply of non-national workers – together with some institutional factors – assume a significant role in explaining occupational polarisation?

Our analysis shows that the rise in share of elementary occupations is largely due to increasing incidence of immigrants as well as medium-qualified workers. In particular, between 2000 and 2008 the non-national component of elementary workers increased by 85.6%, while the rise in national component was only 13.7%. In 2008 the share of immigrants in elementary occupations reached 17% compared to an average of 6% for the other occupations. This is not surprising when considering the peculiar socioeconomic characteristics of immigrants and institutional factors. Migration regulations (plus flexible jobs, undeclared work or cultural factors) can limit market power and the choice of the non-national workforce, thereby favouring labour-market segregation.

Are elementary workers requiring higher formal qualifications?

While part of the rise in elementary worker qualification can be traced back to changes in the content of certain professions, data also suggests it mostly relates to explanations such as general education upgrading or misallocation of labour across occupations due to increasing labour market segmentation. The latter hypothesis is supported by the increase in the share of medium- and high-qualifications of non-national workers, and by the high concentration of immigrants within the group of highly-educated workers in elementary occupations (5.3 times more than in total employment).

What can the analysis of past trends say about the potential role of elementary occupations in the future European labour market?

Much occupational polarisation in Europe can be traced back to macroeconomic and structural changes (between sectors), to demand-driven increase in specific service activities (e.g. private households), and to the increasing labour supply of non-national workers. In light of the continuous shift towards a tertiary-based economy, together with the predictable changes in consumption models and lifestyle of European societies, a relative increase of elementary occupations will likely persist. However, when addressing elementary occupations involving both workers and employers, who are often marginal to the labour market, a more qualitative and institutionally oriented approach could help in better understanding polarisation.

What role can labour market and VET policies (potentially) play?

Immigration regulation, flexible working, undeclared work, and self-employment, are all factors that can modify the opportunity-cost of labour, such as the probability that a person decides to accept a specific occupation. It is possible that labour market segmentation and/or segregation tend to characterise many elementary occupations described as ‘lousy’ jobs (low paying, few opportunities and no benefits) even when it should not be. This means that by reducing the polarisation trend, specific policies, including vocational education and training, could potentially favour ‘occupational upgrading’ in the future. In the absence off new policies and institutional changes, elementary occupations would probably increase and become even more unattractive to the local population. In this scenario, the share of immigrants in elementary occupations is bound to increase.

CHAPTER 1
Background

Since the end of the 1980s the European economy has shown remarkable changes in the sectoral composition of employment. Although globalisation mainly induces acceleration of old patterns of change driven by new technological and geopolitical factors, the common experience of most European countries is declining employment in tradable goods and a parallel rapid increase in employment across a range of services in both traditional and emerging sectors (1). Reducing barriers to international trade, relocation and offshoring, have also been considered as new impetus to substitute less-qualified workers with more-qualified ones, although theoretical arguments and empirical evidence points to their multiple and conflicting effects on relative demand shifts towards highly qualified labour.

At the same time, interest in the role of technological change in explaining labour demand composition has strongly increased; this is especially so since the technological shift brought about by ICT spread through the economy with seemingly non-neutral effects on qualifications and skills required by the labour market. New technologies lead to higher productivity, but the impact on employment is diversified between highly-skilled workers (who complement new technologies) and lower-skilled workers. This is why, despite the large and constant increase in highly-qualified labour supply, the returns on schooling have continued to rise as well, and, in many countries, more skilled and educated workers have increased both their relative employment rate and wages. The skill biased technological change (SBTC) hypothesis has found support in several theoretical and empirical studies ([2]).

Technical and organisational changes are often strictly interrelated. New technologies tend first to induce new organisation of work, and thereby an increase in demand for skilled workers or specific occupations. But the question is, whether the organisational changes observed during recent decades are only a consequence of introducing new technologies, or whether it is possible to

([1]) The shift towards a tertiary-based economy is not a new. However, since the second half of the 1980s computing and some business and household services showed a very strong increase, followed by traditional services such as health, education and tourism-related.

([2]) See Katz and Murphy (1992), Davis (1992), Juhn et al. (1993), Berman et al. (1994, 1998), Katz et al. (1995), Goldin and Katz (1996, 2008), Autor et al. (1998), Acemoglu (1998, 1999), Murphy et al. (1998), Machin and Van Reenen (1998), Haskel and Slaughter (1999), Caroli and Van Reenen (2001), De Santis (2002), Fitzenberger and Kohn (2006), Autor et al. (2006, 2008), Atkinson (2008), Carneiro and Lee (2009). Griliches (1969) was perhaps the first to provide evidence and suggest that capital and skilled labour are relatively more complementary as inputs than are capital and unskilled labour (capital-skill and technology-skill complementarity hypotheses).

identify an autonomous 'organisational effect' on skills and labour demand. Trying to disentangle the effects of technological and organisational changes on skill upgrading, some micro-empirical studies seem also to confirm the skill biased organisational change (SBOC) hypothesis ([3]).

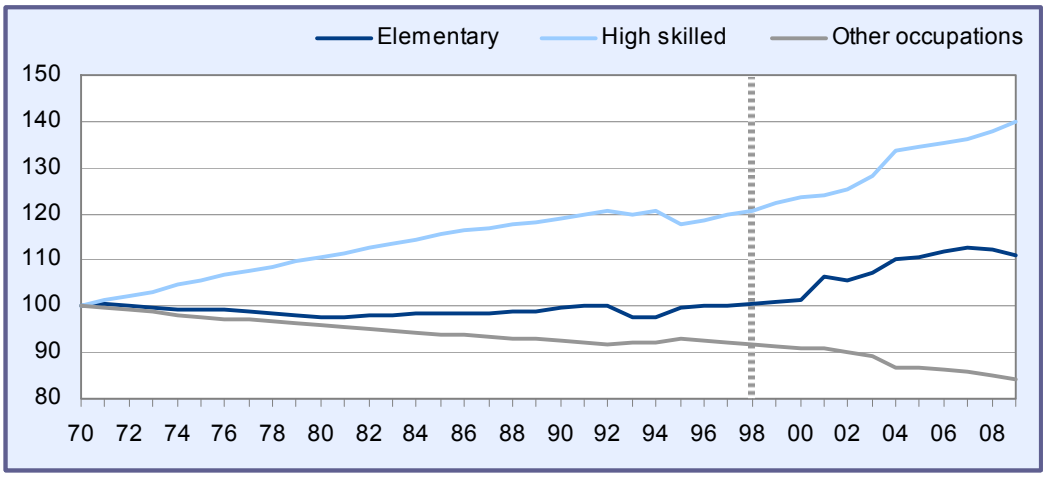
Besides a general trend of expansion of highly-qualified employment, continuing polarisation is affecting the most developed economies (in particular the US but also some European countries such as Germany and the UK). The findings that support this hypothesis are based mainly on a wage structure analysis, highlighting that some countries have increased the shares of both high-paid and low-paid jobs during the last two decades ([4]). The primary explanation is attributable to non-neutral changes in productivity among job tasks prompted by IT advances. While technology can replace human labour in routine tasks, 'many of the worst paid jobs are non-routine in nature and, therefore, have been relatively unaffected by technological change' (Goos et al., 2009). Without contradicting the SBTC hypothesis, the task biased technological change (TBTC) hypothesis focuses on the distinction between routine and non-routine tasks – rather than high- and low-skilled jobs – as a significant driver of employment changes and labour-market polarisation.

The different hypotheses also find support in the analysis of European labour-market trends in terms of qualifications and occupational structure. A rapid increase in the demand for highly-qualified workers within all sectors, occupations and European countries is one of the main trends observed during recent decades. It is part of a long-term trend of educational upgrading of the population and workforce, consistent with the SBTC and TBTC hypotheses. A similar pattern is seen during the last decade for the occupational structure of the economy as a whole, revealing the emergence of a sort of occupational polarisation ([5]). In particular, data from the Eurostat labour force survey (LFS) show:

(a) a large increase in occupations at the higher end of the spectrum (professionals, technicians, etc.);
(b) a decline in most intermediate occupations (craftsman, skilled agricultural workers, etc.);
(c) an increase at the very low end of the spectrum and, in particular, within 'elementary occupations' ([6]) (Figure 1).

([3]) See Caroli and Van Reenen (2001), Greenan (2003), Piva et al. (2005) and Giuri et al. (2008).
([4]) See Autor et al. (2003), Goos and Manning (2003, 2007), Spitz (2003), Spitz-Oener (2006), Maurin and Thesmar (2005).
([5]) Qualification is only one of the criteria taken into account when defining occupations or professions. Work experience, vocational training, experience-related or task related training usually required to do the job are also considered. In ISCO the concept of 'skill' (the ability to carry out the tasks and duties of a given job) takes into account the complexity and range of the tasks and duties involved, and the specialisation (field of knowledge required, tools and machinery used, materials worked on or with, the kinds of goods and services produced).
([6]) According to ISCO definitions, elementary occupations consist of 'simple and routine tasks which mainly require the use of hand-held tools and often some physical effort' (ISCO 9). The

Figure 1. **Share % of highly skilled and elementary in total occupation (EU-27* 1970=100)**



Source: Cedefop (IER estimates based on E3ME, EDMOD and RDMOD).

Polarisation can be defined as the process whereby a specific group tends to be divided into two opposing sub-groups, with members remaining neutral or holding an intermediate position decreasing progressively. Bearing this in mind, and looking at the very long-term picture, it must be considered that, at EU level, the increasing incidence of elementary occupations is quite recent and not particularly significant:

(a) until the late 1990s the share of elementary occupations remained steady, whereas the first three main groups (ISCO 1, 2 and 3) increased almost constantly between 1970 and 2000;

(b) elementary occupations were only 8.6% of total employment in 2000 and increased to 9.6% in 2000-09, while the incidence of the first high-skilled groups ([7]) increased by 3.9 percentage points (from 34.8% to 38.62%);

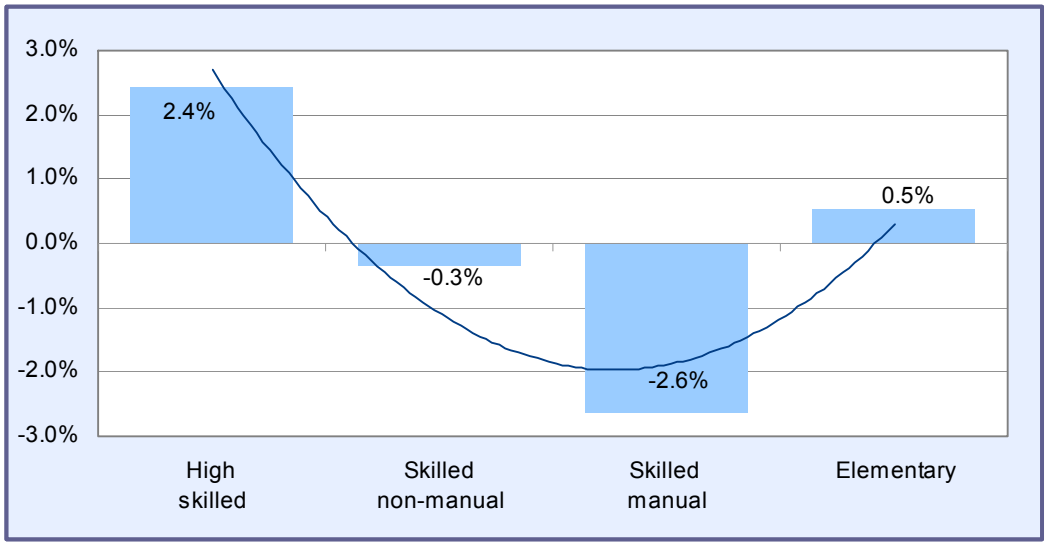
(c) the phenomenon is partly heterogeneous across countries and, above all, affected some specific occupations within the elementary group.

In conclusion, an occupational polarisation emerged only during the decade 1998-2008; in addition, in the last two years elementary occupations seem to be losing ground to other occupations and especially to the first three main groups. However, the results of the Cedefop skill forecast (Cedefop, 2010a) confirm the hypothesis that polarisation took off in recent years in most European countries and is bound to continue in the next decade (Figure 2).

three main sub-major groups included are elementary occupations typically involved in sales and services, agricultural, fishery and related activities, mining, construction, manufacturing and transport.

([7]) We classified as high-skilled three main occupational groups: legislator, senior officials and managers; professionals, technicians and associate professionals (see Annex B).

Figure 2. **Projected change in share in occupational structure EU-27* 2010-20**



Source: Cedefop (IER estimates based on E3ME, EDMOD and RDMOD)

Again, the dimension and the intensity of these trends are expected to differ between countries, sectors and even between specific occupations within the major group of elementary occupations ([8]).Interpretation is complicated by the fact that results also suggest increasing deployment of higher- and medium-qualified people in low-ranked occupations. At first glance, the task approach offers a better framework for understanding these trends, particularly when suggesting the existence of a ubiquitous shift – also within elementary occupations – from cognitive and manual routine tasks to analytical and interactive activities.

Against this background, the occupational polarisation hypothesis is fertile ground for research on the relevant implications, both for policy-making and for the implementation of Cedefop scenario model applied to European forecasts itself. Considering that the main structural trends of EU economies are oriented towards an increasing demand for highly-qualified workers and for high-ranked occupations, how should we interpret the possible emergence of a concomitant rising demand at the lower end of the occupational structure?

([8]) E.g., it could be more relevant for countries still in transition toward a service-based economy, or where some kind of service activities are expected to become increasingly relevant in the near future (due to the level of wealth or the pace of ageing).

CHAPTER 2

Possible explanation for occupational polarisation

At micro level, i.e. from the point of view of the individual worker or employer, occupational choice/change is not only a consequence of exogenous macro phenomena. Although occupation is, first, an important link between training and earning, the probability that a person decides to seek/accept a specific occupation – or that an employer decides to offer a job with a particular occupation – is the result of a complex decision process that involves (Abowd and Farber, 1982; Mohanty, 2001):

(a) from the workers side:
    (i) the predicted decline/increase in the returns from alternative occupations;
    (ii) the expected unemployment risk associated with alternative occupations;
    (iii) the worker's family income;
    (iv) the inter-sectoral/inter-area mobility costs (search costs, transfer costs and the other components of the reservation wage);
    (v) individual preferences and expectations about non-monetary working conditions, working content (gratification), career development expectation, and other psychological or sociological factors;
(b) from the employer's side:
    (i) the expected productivity of alternative workers/occupations;
    (ii) the cost incidence of on-the-job training needed in relation to different types of workers/occupations;
    (iii) the actual transferability of skills between occupations;
    (iv) relevance of other factors (related to non-profit motivations underlying many business activities, individual intuitive perception about market perspectives, etc.).

In this framework, the individual choice of workers and employers in terms of occupations might not coincide (and they generally do not), generating an occupational mismatch of which skill mismatch is only one component. Employment, depends on two simultaneous decisions: of the worker to participate in the labour market and of the employer to hire him/her from the group of potential applicants.

Occupational changes are also influenced by structural determinants at macro level. Most empirical studies show that labour-market mobility – occupational, sectoral and geographical – is, above all, an individual behavioural response to medium- or long-term macroeconomic changes. Four main structural drivers of change in labour demand by occupation can be identified (Table 1).

Table 1. **Main structural determinants of occupational changes at macro level**

	Demand drivers	Supply drivers
Growth and distribution effects	• Engel's Law (or similar) • wage inequality/ income distribution effect	• increasing returns diversified by sectors and/or occupations (Kaldor-Verdoon effect), changes in the inter-sectoral links
Competitiveness effects	• extension of needs and intensive diffusion of consumption patterns • increasing movement of goods and people	• internationalisation/ globalisation (Stolper-Samuelson effect, offshoring, IDL and specialisation in general)
Technological and organisational effects	• changes in models of purchasing (retail/ delivery), reduction of transaction times, consolidation effect, quality effect, innovation and creation/substitution of needs	• skill-biased technological change, routinisation hypothesis, etc. • job specific productivity, outsourcing, new inputs sectors
Socio-demographic macro trends and institutional effects	• increasing participation and employment rates (especially women) • changes in family/social structures and changes in lifestyle in general	• changes in substitution relations between occupations due to flexible labour-market institutions, black economy, migration flows, etc. • educational and social objective functions (policies)

All potential drivers include factors that would act on both the demand side and the supply side. With some approximation it is possible to say that while demand side factors mainly lead to occupational changes between sectors (i.e. through increasing demand for superior goods, immaterial goods, household services, etc.) ([9]), supply side drivers mostly have an effect within sectors by changing production methods.

Supply side changes also contributed to the historical shift towards an industrial society and then to a tertiary-based economy. What is important in this context is that they brought about significant substitution effects within the individual sector, modifying the occupational-specific opportunity-cost and the occupational composition within the individual production process. Alongside the general trends of increasing return entailed by economic growth (diversified by sector and/or occupation), the three main drivers considered in literature can be traced back to competitiveness and international trade, technological/organisational or task-content changes, and socio-institutional aspects. All are factors likely to have contributed to a changing occupational structure of labour demand within individual sectors and labour supply characteristics and expectations.

In line with the expected consequences of most structural changes set out in Table 1, on the demand and supply side, data clearly shows that jobs at the upper end of the occupational skill distribution – which usually require also a higher level of formal qualification – tend to absorb an increasing share of labour-market demand. However, in most European countries increasing labour demand is also emerging in a growing number of lower level jobs, especially within some private personal services. Data show that people with higher-level qualifications are increasingly employed in jobs where lower qualification levels used to be

([9]) E.g., some demand side drivers considered (increasing income inequality, higher participation rate, family fragmentation process, and economic growth itself) can all contribute to increasing demand for some kind of superior goods (culture, recreational, tourism, luxury, etc) or household services.

adequate. The passage from the SBTC to the TBTC hypothesis gives some explanation of this apparently contradictory twofold phenomenon (i.e. an increasing share at both higher- and lower-levels of the occupational spectrum). The adoption of a task-approach allows us to focus on the task-dimension of employment that is related to, but not completely explained by, the qualification level (Table 2).

Table 2. **The impact of computerisation on three broad task categories**

Task description	Example occupations	Potential impact of computerisation
Routine tasks • rules-based • repetitive • procedural	• bookkeepers • assembly line workers	direct substitution
Abstract tasks • abstract problem-solving • mental flexibility	• scientists • attorneys • managers • doctors	complementarity
Manual tasks • environmental adaptability • interpersonal adaptability	• truck drivers • security guards • waiters • maids/janitors	limited complementarity or substitution

Source: Autor, 2007.

Following Autor (2007), the division of productive tasks into abstract-complex tasks, routine and manual tasks is to be considered. In this framework the impact of new technologies is clearly diversified:

(a) technological change (especially ICT) and related organisational changes increase the productivity of medium-skilled workers involved in routine jobs, rendering obsolete manual and non-manual activities that were previously done by such workers;

(b) many non-routine tasks – also carried out in elementary and manual occupations – are difficult to complete by new technologies and machines without human intervention ([10]).

Since most non-routine tasks lie at the opposite end of the occupational skill distribution, the TBTC entails a progressive polarisation of the labour market.

This 'passive way' to job polarisation (unlike many medium routine jobs, some low non-routine jobs are not displaced by new technologies) has found support in several studies carried out for the US, the UK, and for some European countries ([11]). Although affected by strong data limitations, similar results have been obtained by Goos et al. (2010) considering the period 1993-2006 and 16 European countries. They also report that the task dimension is a significant

([10]) Although Goos and Manning (2003) consider the relationship with respect to non-routine manual jobs more ambiguous.

([11]) For the US see Autor et al. (2003, 2006, 2008). For the U.K. see Goos and Manning (2003, 2007). For France see Maurin and Thesmar (2005). For Germany, Spitz-Oener (2006) shows that 'West Germany has witnessed changes in skill requirements similar to those in the US in recent decades', even though 'similar changes in skill requirements in all of these countries have not led to similar changes in the wage structure'.

predictor for employment change, even after the model is controlled for the formal qualification level.

The starting point is the acceptance, in general terms, of the SBTC and TBTC hypotheses. However, we focus on the occupational polarisation that is particularly relevant when implementing forecast models and labour-market scenario analyses as a tool for policy-making in education and training. When analyses are carried out using occupations instead of qualifications or wages, emerging long-term polarisation is founded on a less robust evidence base, especially in light of the more recent trends ([12]). Moreover, while occupational polarisation could well have a foundation in the consequences of a skill-biased shift in demand, unless assuming a perfectly competitive labour market ([13]), a wage-structure approach is not totally significant. This is true in general but especially when comparing the European and the US labour markets, not only for the differences in economic growth, industry mix and income distribution among the two areas, but also for the differences in labour-market institutions and welfare policies. Further, the EU internal labour market is still characterised by higher cross-country disparities and lower mobility compared with the US. Despite the enormous progress made in the past 15 years, historical and structural causes (language and sociocultural in nature), and many institutional factors, render the EU labour market much more diverse and ultimately dissimilar to that of the US.

The analysis that follows, mainly descriptive, is a first step towards a full understanding of the polarisation and its causes in Europe. The main thesis is that socio-demographic and institutional factors – such as ageing or labour-market institutions and policies – could have played a significant role in the increase in employment in elementary occupations. Starting from a brief description of the phenomenon, we will attempt in the following sections to gather evidence relating polarisation to three main macro-factors:

(a) a list of possible drivers of change (especially on the demand side) that have brought about a different sectoral composition of production in European countries during the last decade;
(b) several possible causes of internal changes in the production process considered as a whole – whether technological, organisational or in task content – influenced by innovation and changes in modes of production (effects of competition and globalisation included);
(c) socio-institutional factors, such as different levels of formal and informal barriers to labour mobility, that can lead to mismatch problems (whether qualitative, quantitative or of a spatial nature).

([12]) The share of elementary occupations was steady in 2008 and declined in 2009.
([13]) In a perfectly competitive labour–market, wages are strictly linked to productivity and, in turn, productivity to training and human capital content of the workers.

CHAPTER 3

Recent structural change in occupations: some stylised facts

The aim of this research is to analyse recent employment trends to confirm the emerging structural increase in elementary occupations in Europe and to examine its main characteristics. Is it possible to identify a clear increasing trend in labour demand for elementary occupations? Is this trend more prominent than for other occupational groups? If so, does this phenomenon assume a general value or is it sectorally and/or spatially concentrated?

3.1. Is it possible to identify a clear increasing trend in labour demand for elementary occupations?

Even though the recent economic crisis has partially changed the picture, looking at the period 2000-08 ([14]) elementary occupations show a clear positive trend (Figure 3). The index number of employment in elementary occupations reaches 122 in 2008, definitely higher than the aggregate of intermediate skilled occupations both manual and non-manual. In particular:

(a) from 2000 to 2008 the number employed in elementary occupations increased by almost 3.9 million in EU-27* ([15]), contributing 20% to the overall growth of employment occurred in that period (about 20 million);

(b) elementary occupations showed an overall growth rate of 22% compared to 10% of the average employment trend, a percentage only lower than some highly-qualified occupations such as professional and technician.

3.2. Are lower-skilled occupations absorbing an increasing share of labour market demand?

As a consequence of the trends described above, the answer is clearly positive (Figure 4). The proportion of elementary occupations in total employment increased from 8.7% to 9.6%, unlike all the other groups except highly-skilled occupations that increased from 34.6% to 38.6%. Considering the entire period

([14]) Due to data availability, we focus on 2000-08 period (Box 1).
([15]) EU-27* refers to the 27 EU Member States plus Switzerland and Norway.

2000-08 this positive trend is therefore quite constant over time, both in number and in share of total occupations, even though the incidence of elementary workers slightly decreases during the last year.

Box 1. **Data on occupations**

Both the International Labour Organisation and Eurostat (LFS) provide employment data by occupation according to ISCO (*). Although aggregated into 10 broad occupations only (one digit), Eurostat data are comparable across countries and usually more frequent and timely. The variables are offered by country and consider some personal characteristics of the workers (gender, three age groups and three education levels). To obtain more detail, Cedefop made a specific request to Eurostat that was fulfilled before the new database for the year 2009 was available. For this reason all the analyses are carried out for the time span 2000-08. Information coming from this special extraction (flat file), have been used mainly to obtain:

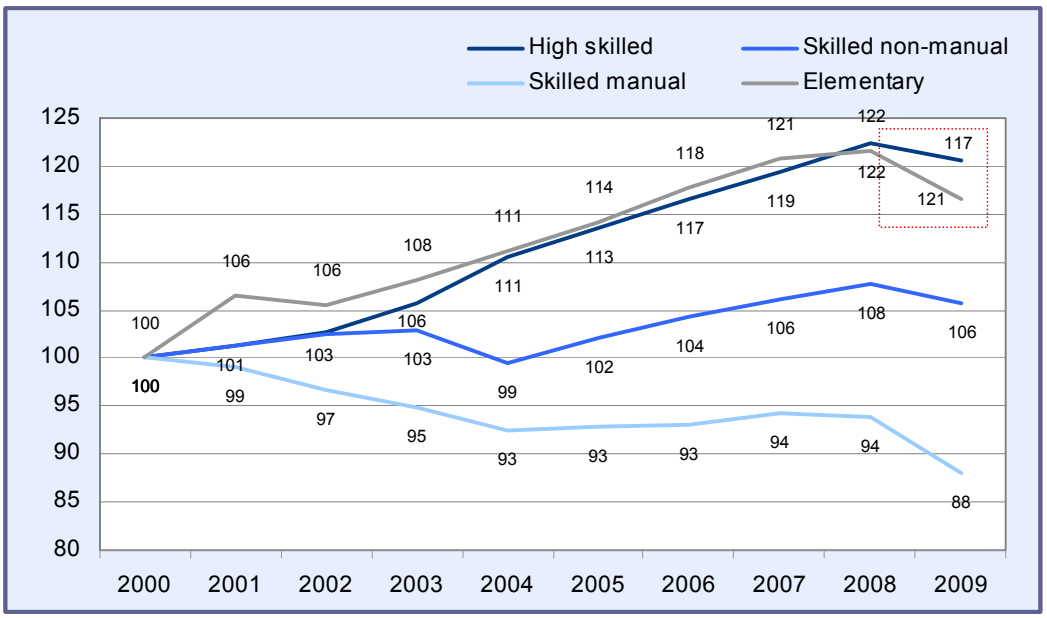
- data on occupations by industrial sectors (17 sectors – NACE rev.1.1);
- a wider disaggregation of worker age groups and especially of occupation (two-digit) to distinguish elementary occupations in their sub-major groups ('sales and services', 'agricultural and fishery', 'mining, construction, manufacturing and transport');
- more information about worker characteristics and, in particular, about nationality (national/non-national) and part-time/full-time work.

To ensure total consistency with published Eurostat data, the vector employment by occupation available in the Eurostat online database was used to square all the other tables (totals from the vector applied to the structure resulting from the special extraction data sources). In particular, for ISCO 0 to 9 the reference vector (from the Eurostat online database) is applied to the distribution by country. For ISCO 9.1, 9.2, 9.3 the values for ISCO 9 (obtained as mentioned above) are redistributed in the three sub-major groups according to the composition of the Eurostat flat files. Finally, all data on occupation refers to people age 15+; the item 'other' is a residual item containing 'armed forces' and no answer; and the aggregate EU-27* refers to EU-27 (figures as provided by Eurostat) plus Switzerland and Norway.

(*) The international standard classification of occupations (ISCO) is a tool for organising jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. The classification unit is the job (a set of tasks and duties), or the 'kind of work done' and further criteria are skill level and skill specialisation. Occupation is defined as a 'set of jobs whose main tasks and duties are characterised by a high degree of similarity'. The third version of ISCO (ISCO-88, adopted in 1987) defines four levels of aggregation: 10 major groups; 28 sub-major groups; 116 minor groups; 390 unit groups. ISCO has been updated in December 2007. Many countries are updating their national classification based on ISCO-08. For further information see www.ilo.org.

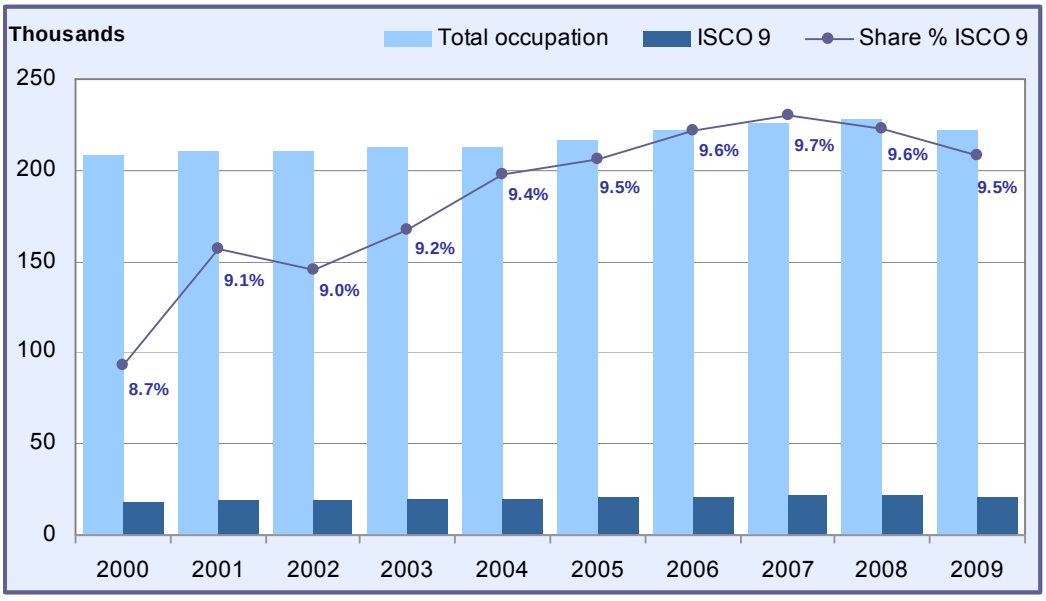
This trend highlights the existence of occupational polarisation, even though elementary occupations remain under 10% of overall employment. It must also be considered that the share of elementary occupations remained steady around 8.4% throughout the whole period preceding the time frame for our analysis, i.e. 1970-2000. Apart from the decrease in 2009, simultaneously, with the economic crisis, the whole increase in share occurred in only eight years, from 2000 to 2008 (Table 3).

Figure 3. **Employment trends by occupations in EU-27* (2000=100)**



Source: Eurostat, LFS – Reference age: 15+

Figure 4. **Elementary occupations: trends and share % in total employment (EU-27*)**



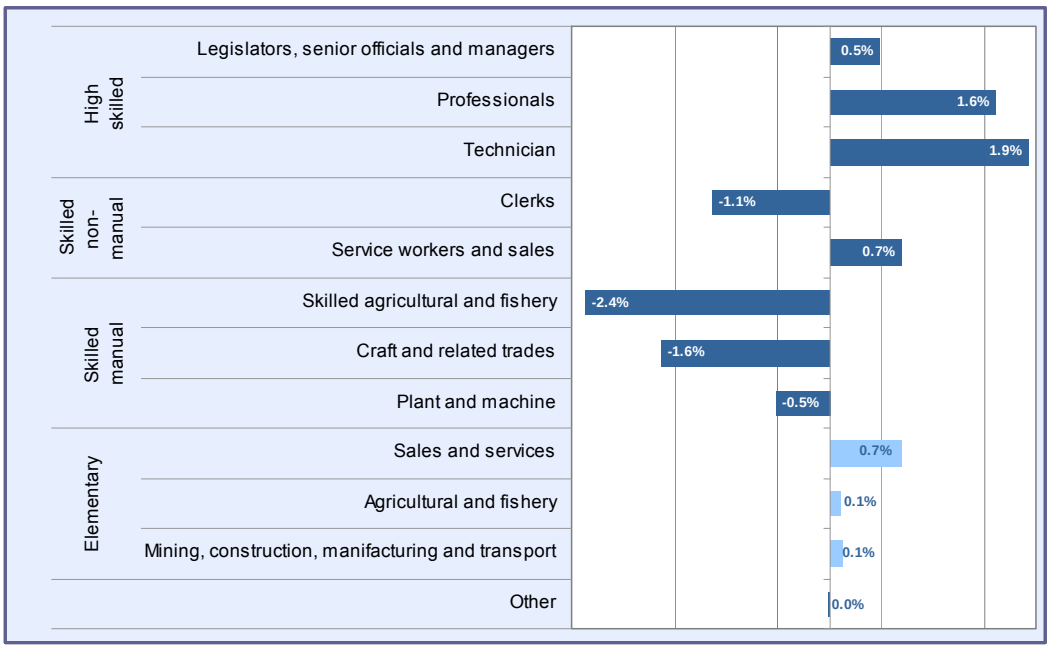
Source: Eurostat, LFS – Reference age: 15+

Table 3. **Average share % of elementary in total occupation EU-27***

1970-1980	1980-1990	1990-2000	2000-2008
8.5%	8.4%	8.5%	9.3%

Looking in detail at the 'major group' of elementary occupations (Figure 5), the 'flat data' acquired from Eurostat allows us to analyse also three sub-major groups of elementary occupations: involved in sales and services, agricultural, fishery and related activities, mining, construction, manufacturing and transport.

Figure 5. **Trends in the share of occupations in EU-27* 2000-08**



Source: Eurostat, LFS – Reference age: 15+

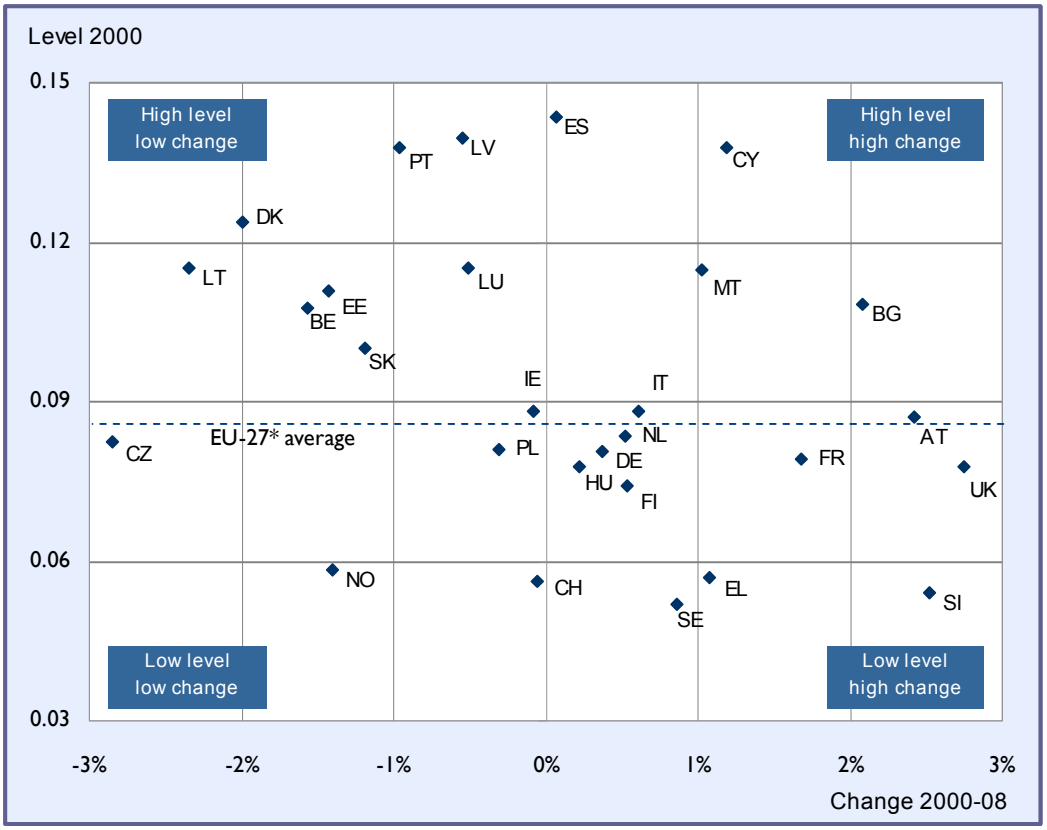
The first sub-major group has also been the most dynamic (and substantial in size) during the last decades. It mainly consists of tasks connected with street or door-to-door sales or services, or cleaning, property watching and caretaking, delivering goods and messages or carrying luggage. The other two sub-major groups also increased their proportion of total occupations, but to a limited extent. Most intermediate occupational groups show significant loss of overall proportion, except for sales and services skilled non-manual occupations.

3.3. What differences can be observed across countries and sectors?

Looking at Figure 6 it is difficult to identify a common pattern or model among European countries:

(a) level and, especially, change in share of elementary occupations in total employment is varies widely among countries;
(b) in almost half of them, the share of elementary occupations decreases between 2000 and 2008 and no convergence trend can be identified;
(c) some of the biggest countries tend to absorb most of the general positive trend.

Figure 6. **Share of elementary in total occupation, EU-27*, in 2000-08**



Source: Eurostat, LFS – Reference age: 15+.

Figure 7 gives an idea of the impact this difference in trends can produce on overall performance. When excluding the five largest countries (Germany, Spain, France, Italy and the UK) the average share of elementary occupations remains steady between 2000 and 2008. No general trend can be identified, and no general explanation for the variability of the phenomenon among countries can be formulated on this simple basis.

From a sectoral point of view the picture is quite different (Table 4):

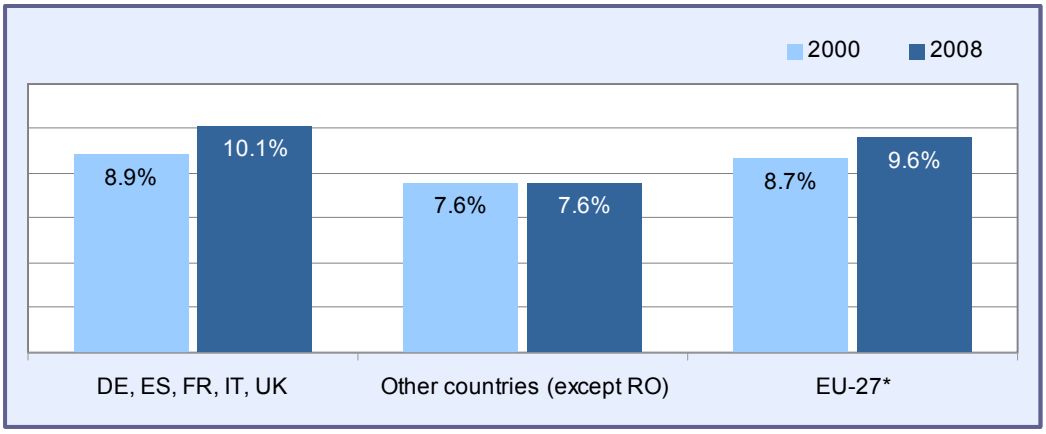
(a) despite the heterogeneous nature of the sectors considered, a first piece of evidence is that a polarisation trend involves most sectors, with the only exceptions being ‘education’, ‘health and social work’ and ‘fishing’. Therefore, it must be considered that ‘education’ and ‘health and social work’ have both a high initial level of polarisation;

(b) many service sectors present the highest increases in polarisation, especially ‘private household’ and ‘public utilities’, but also ‘agriculture’ shows a rapid increase so that, in 2008, it became the second sector in ranking by incidence of elementary occupations;

(c) tangible increases in elementary occupation are concentrated into few sectors and, in particular, in ‘private household’, ‘agriculture’ and, to a more limited extent, ‘transport, storage and communication’ and ‘wholesale and retail trade’.

Also, 'private household' and 'agriculture' are the two sectors with the best and the worst overall employment performances (+42.3% and -42.5% respectively), so that 'private household' emerges as the unique sector where the polarisation is explained by a significant positive increase in elementary occupations.

Figure 7. **Change in share of elementary in total employment, in 2000-08**

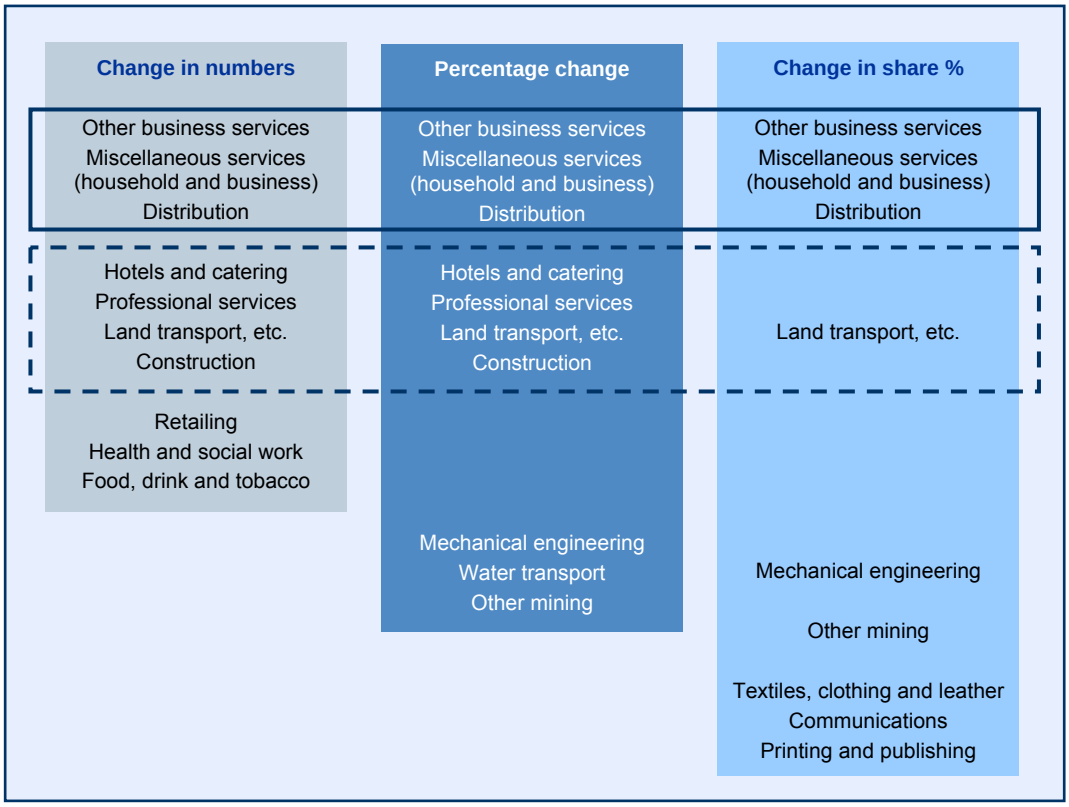


Source: Eurostat, LFS – Reference age: 15+

Table 4. **Sectoral trends and polarisation, EU-27*, 2000-08**

		Overall growth (%)	Polarisation (changes in share ISCO 1+2+3+9) (percentage points)	Incidence elementary (change in share ISCO 9) (percentage points)
GROWING SECTORS	Private household	42.3	10.3	9.2
	Real estate renting and business activities	31.4	3.1	-0.2
	Hotels and restaurants	16.8	1.5	0.1
	Health and social work	12.5	-2.0	0.0
	Construction	6.0	0.5	-0.1
	Other community social and personal service	5.8	0.8	-1.1
	Extra-territorial organisations	4.0	10.9	-0.3
	Education	-0.1	-0.3	-1.0
FALLING SECTORS	Financial intermediation	-1.0	6.9	-0.2
	Wholesale and retail trade	-1.5	6.0	1.3
	Public administration	-2.8	2.5	0.6
	Transport storage and communication	-3.3	4.4	2.5
	Electricity gas and water supply	-15.1	9.3	-0.3
	Manufacturing	-15.9	4.6	-0.1
	Fishing	-26.4	-0.4	-0.1
	Mining and quarrying	-41.0	7.7	0.0
	Agriculture	-42.5	10.5	7.2

Figure 8. **Fastest growing sectors ranked by growth in numbers (2000-08)**



Legend:

Distribution	50	Sale and repair of motor vehicles and motorcycles; retail sale of automotive fuel
	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
Other business services	74.5	Labour recruitment and provision of personnel
	74.6	Investigation and security activities
	74.7	Industrial cleaning
	74.81	Photographic activities
	74.82	Packaging activities
	74.85	Secretarial and translation activities
	74.86	Call centre activities
	74.87	Other business activities n.e.c.
Miscellaneous services	90.01	Collection and treatment of sewage
	90.02	Collection and treatment of other waste
	90.03	Sanitation, remediation and similar activities
	91.1	Activities of business, employers and professional organisations
	91.2	Activities of trade unions
	91.3	Activities of other membership organisations
	92	Recreational, cultural and sporting activities
	93.01	Washing and dry-cleaning of textile and fur products
	93.02	Hairdressing and other beauty treatment
	93.03	Funeral and related activities
	93.04	Physical well-being activities
	93.05	Other service activities n.e.c.
	95	Activities of households as employers of domestic staff

Data do not allow us to analyse further the particular activities affected by polarisation. The maximum disaggregation by sectors and occupations offered by Eurostat (with sufficient degree of reliability) is only at first level. Nevertheless, Figure 8 presents the trends in polarisation and elementary occupation share, based

on the Cedefop database ([16]) for the first 10 sectors with the highest employment growth (in numbers, percentage rate and change in share) in 2000-08:

(a) most of the economic activities experiencing the highest increase in share of elementary occupations are service sectors, though also construction, and to a minor extent mechanical engineering and some traditional and basic industrial sectors, show significant performance;
(b) however, only the first three service sectors that show up in the ranking increase at the same time in terms of absolute number, percentage change and share in total employment;
(c) further, the three best performers are 'emerging service' – though generally rarely technologically innovative – as testified by their inclusion in the 'residual' statistical category (other business services and miscellaneous services).

The latter point is particularly relevant from an explanatory point of view. In light of the specific activities included in 'other business services' and 'miscellaneous services' (legend Figure 8), the positive trends highlighted are more likely to be influenced by social and demographic structural changes (female participation in the labour market, changes in lifestyle, flexibility of the labour market, migration, etc.) rather than technological or organisational change.

([16]) Cedefop-IER based on E3ME (41 sectors).

CHAPTER 4

Structural changes versus occupational-specific changes in employment

The above analysis showed that high-skilled work continues to absorb an increasing share of labour-market demand. Polarisation also emerged during the last decade, although of small magnitude, and tends to concentrate in particular sectors, especially in service sectors. Against this background, even when the 'polarisation hypothesis' is proven from an empirical point of view, it remains to be understood to what it should be attributed. A first step in this direction is to assess to what extent the observed occupational trends are the result of sectoral composition changes that affected European economies during the last decade or are a consequence of skill composition changes within sectors brought about by technological and/or organisational factors.

To answer this question each individual occupational growth rate has been divided into two main components:

(a) structural component (changes between sectors);
(b) occupational-specific component (occupational composition changes within sectors).

Using a shift-share approach (Box 2), we assume that the occupational shares in a given sector should remain unchanged over time. Keeping the occupational shares constant, the analysis aims to identify the occupational intensity changes within sectors – as positive or negative – that is necessary to adjust the actual change observed within the individual sector. On this basis, the actual employment growth of an occupational group in a given sector is attributed to the following three factors:

(a) the effect of a general increase in demand for all occupations and sectors (overall growth rate);
(b) the different increases in demand that affect individual sectors (sectoral composition effect, changes between sectors);
(c) changes in the 'occupational intensity' within individual sectors (occupational intensity effect, changes within sectors).

The polarisation hypothesis emerges more clearly, although with some differences, by focusing on the structural-sectoral changes (between sectors), rather than by considering the aggregate growth rate (Figure 9). The divergent trends between occupations are more clear, with intermediate occupations showing a strong decreasing trend while high-skilled and elementary occupations are all increasing significantly. However, in this case also 'clerks' demonstrate a positive trend supported by favourable sectoral changes.

Box 2. **The shift-share approach**

The shift-share analysis is habitually used to identify two main components, 'structural' and 'local', of the employment dynamics observed among different sectors and regional areas. In this context, the general approach has been adapted to evaluate to what extent the observed changes in occupations in 2000-08 can be attributed to an actual increase of 'occupational intensity' within sectors (likely due to technological/organisational factors or task content changes), or if they are a direct consequence of changes in sectoral composition.

To this end, the first step consists of applying the aggregate growth rates of the individual sectors to the given occupation structure observed for the same sector in the base year. The result is a 'hypothetical growth' rate (OG*) for each individual occupation due to the sectoral changes, in unchanging occupation share implied by the 'constant share norm'. On this basis, the actual growth of individual occupation (OG) can be divided into three distinct components:

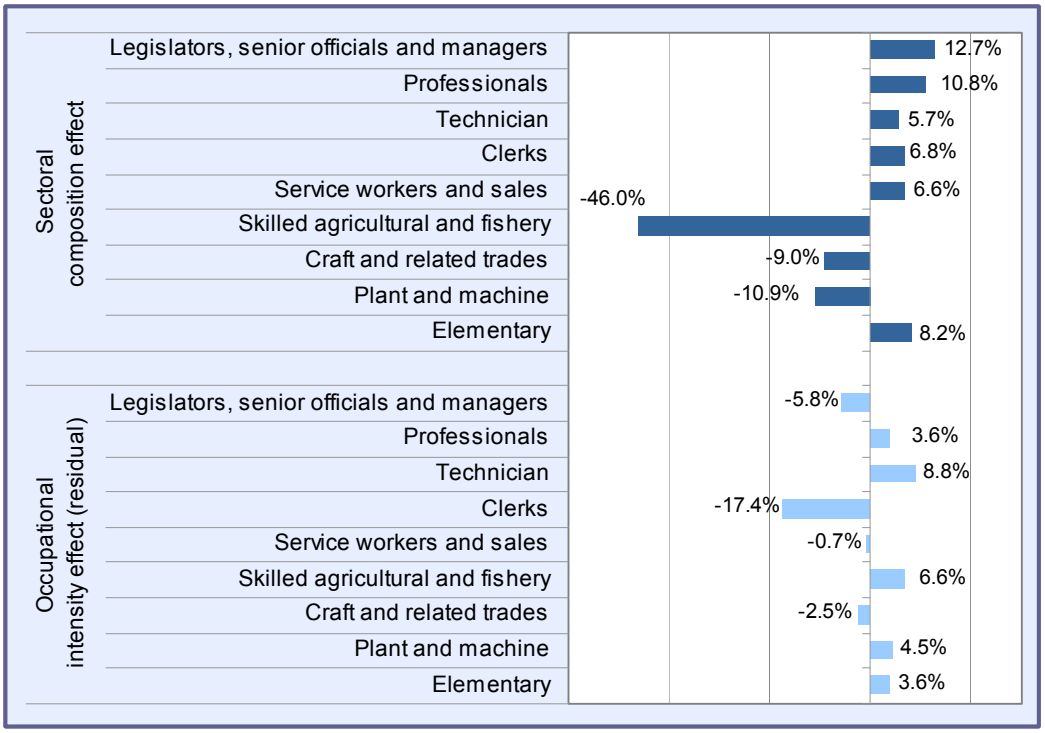
- the aggregate component, which is the overall growth rate of the economy – for all sector and occupations – in 2000-08 (AG);
- the sectoral-structural component, which is the difference between the hypothetical growth rate of occupations and the overall growth rate (OG*-AG), thereby highlighting to what extent the initial composition has been relatively favourable or unfavourable to individual occupations;
- the occupational-specific component, due to other growth factors occurring within the individual sector, obtained by subtracting the individual occupation growth from the structural component calculated on the basis of the sectoral performances (OG-OG*)

Occupation growth		Aggregate component		Structural sectoral component		Occupational specific (residual) component
OG	=	AG	+	(OG*-AG)	+	(OG-OG*)

Looking at the occupational-specific changes (within sectors), the picture that emerges is more varied, with positive and negative trends both for high-skilled and low-skilled work (Figure 9). For example, the reduction in some occupations – such as 'skilled agricultural and fishery' or 'plant and machine operators' – has to be totally ascribed to the structural decline of some economic activities. For 'clerks' the opposite is true as the occupational intensity of this kind of occupation dramatically decreased during 2000-08.

Generally speaking, the higher the impact of the occupational-specific effect, the greater is the possible importance of technological/organisational changes and of the TBTC hypothesis. When excluding from the analysis the consequences of sectoral changes, it is no longer possible to identify an occupational polarisation. A crowding-out effect appears particularly strong for 'clerks', but it is also significant in occupational groups at the high- and low-end of the occupational ranking. On the other hand a (potential) complementarity with technological progress emerges also for some intermediate skilled occupations.

Figure 9. **Sectoral composition effect and occupational intensity effect in occupation growth**



Source: Author, based on Eurostat LFS.

Figure 10 gives a synthetic idea of the importance of the two components (structural and occupational-specific) in the overall growth of individual occupations.

Looking at the clusters identified (Box 3), the main conclusions are the following:

(a) the shift-share analysis of occupations shows that the polarisation has been largely determined by the sectoral trends which occurred during 2000-08, while the potential role of technological and/or work content changes within sectors has generally been weaker and more uncertain;

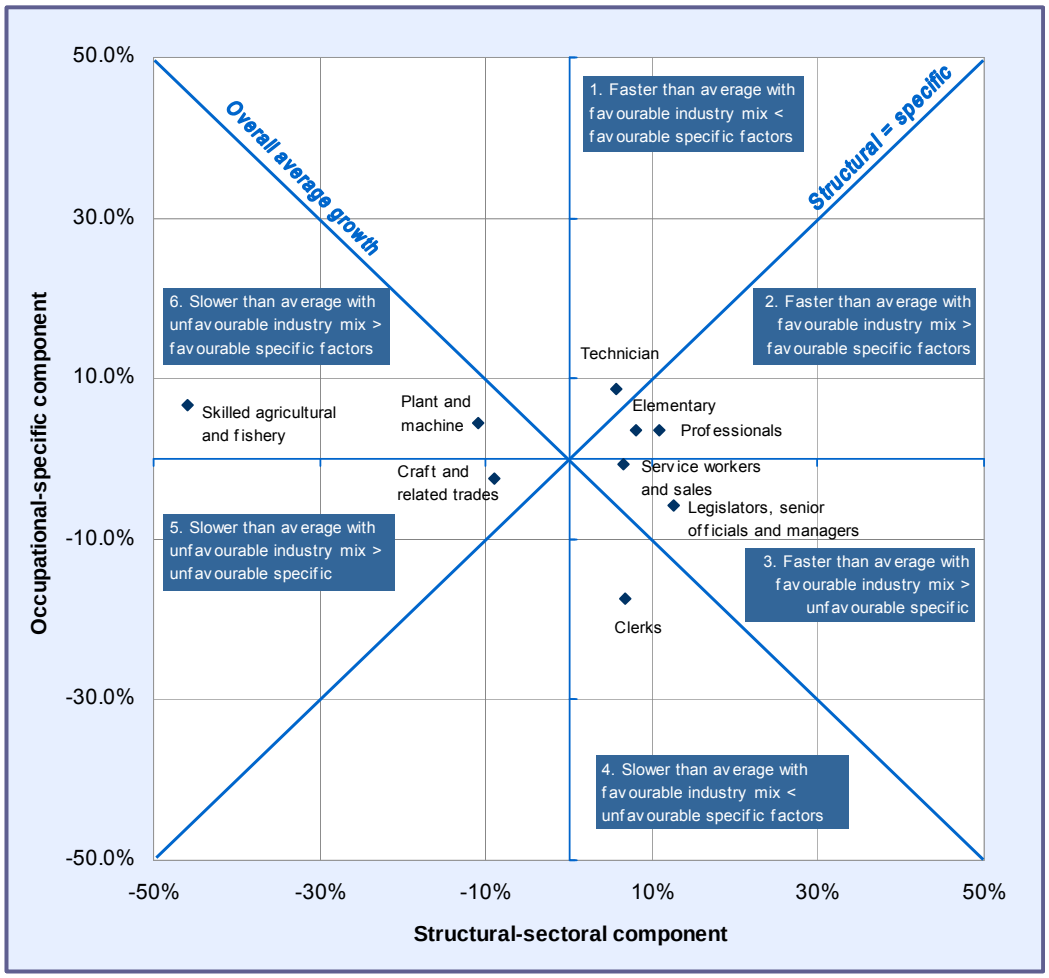
(b) an increasing trend in share of occupations is always associated with a positive structural-sectoral component, although for ‘clerks’ it is not enough to compensate the negative occupational-specific effect;

(c) a predominance of the occupational-specific effect can be highlighted only for ‘technician and associate’ while for ‘legislator, senior official and manager’ the occupational-specific effect is negative;

(d) although ‘elementary occupations’ appear among the groups showing positive trends both in terms of sectoral composition and occupational-intensity effects, only a minor part of this trend can be ascribed to an increasing proportion of elementary occupations within individual sector;

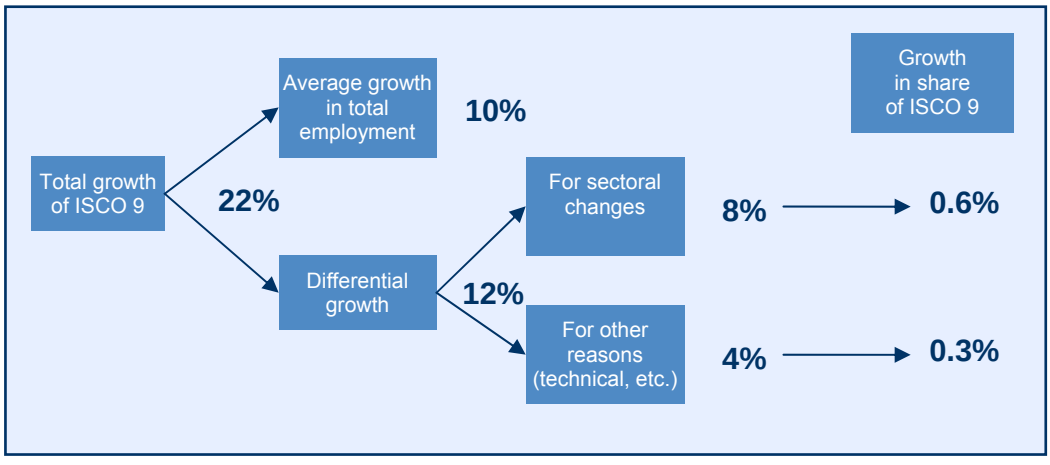
(e) of the overall growth in share of ‘elementary occupations’ (0.9 percentage points from 2000 to 2008), only 0.3 percentage points can be attributed to occupational-specific explanations (fig. 15).

Figure 10. **Shift-share groups: structural and occupational-specific growth components**



Source: Author, based on Eurostat LFS.

Figure 11. **Main components of elementary occupations growth 2000-08**



Source: Author, based on Eurostat LFS.

Box 3. **Shift-share groups interpretation**

Figure 10 must be read in four dimensions: (1) the oblique 135° line divides the occupations between fast-growing and slow-growing occupations (faster or slower than the average employment growth); (2) along the X axis, the relevance of the structural-sectoral effect is measured (positive or negative changes between sectors); (3) along the Y axis the relevance of the occupational-specific effect is measured (positive or negative changes within sectors); (4) finally, the 45° line distinguishes the occupations where the occupational-specific effect is more favourable (or less unfavourable) than the other.

On this basis, six relevant clusters of occupations can be identified.

	Occupations	Growth in share	Structural-sectoral component		Occupational-specific component
1.	• technician and associate	faster than average	positive	<	positive
2.	• professionals • elementary	faster than average	positive	>	positive
3.	• service workers and shop/ market sales • legislators, senior officials and managers	faster than average	positive	>	negative
4.	• clerks	slower than average	positive	<	negative
5.	• craft and related trades	slower than average	negative	>	negative
6.	• plants and machines • skilled agricultural and fishery	slower than average	negative	>	positive

CHAPTER 5

Potential labour-supply drivers of occupational changes

The contribution of elementary occupations to growth is still relatively small and is largely due to structural changes in sectoral composition rather than in production methods within sectors. Hence, the observed trends are likely to be associated mainly with changes in inter-sector productivity or in demand drivers, whether brought about by general growth, socio-demographic trends or by some alteration in consumption patterns of the population. However, supply side factors – and in particular the SBTC and TBTC hypotheses – also appear to play a potentially important role. For high-level occupations, it is confirmed by the dramatic increase both in numbers and in share which occurred in recent decades and partly corroborated by the wage premium observed in some occupations at the upper tail of income distribution ([17]).

If technological development and/or changes in work content are also in favour of elementary occupations, an increase in the relative wage should be observed at the lower end of the occupational structure as well. Apparently, this is not what happened (Table 5). Even though data available do not offer precise evidence on this issue ([18]), an attempt to construct an occupational wage measure for 1993-2006 shows that elementary occupations are among the lower paid and do not seem to improve their ranking during the period, whereas some high-paid occupations (particularly professionals) continue to enhance their position ([19]).

([17]) Earnings inequality in the US is reported to have risen in several empirical studies (see footnotes 2, 4; and Autor, 2007). Gottschalk and Smeeding (1997) review the evidence on cross-national comparisons of earnings and income inequality in OECD countries. Goos et al. (2010) provides a wage rank of occupation in 1993 and 2006 for 16 European countries. As expected, professionals show the highest increase. This is not the case for managers. However, the ranking is very stable within countries over time, with Spearman rank correlation coefficients of around 0.90, all significant at the 1% level.

([18]) Considering that the EU LFS contain no earnings information. Goos et al. (2010) obtain time-varying country-specific occupational gross monthly wages from ECHP (for 1994-2001) and EU-SILC (for 2004-06), except for the UK (UK LFS for 1993-2006). All wages have been converted into EUR 2000 using harmonised price indices and real exchange rates. Given that the occupational wage ranking appears to be very stable within countries over time, Goos et al. impute wages for missing years by setting them equal to the average wage across the closest years where original data were available. Finally, they smoothed wages in each country by pooling together all years for each occupation and by estimating a model in which the dummy on occupation varies smoothly with a quadratic time trend.

([19]) See Goos et al., 2010. As expected, managers and professionals are at the top of the ranking, while service workers and elementary occupations at the lower end.

Table 5. **Real monthly wages of occupations across 16 European countries**

	Occupations ranked by the 1993 mean wage	1993	2006
High paid occupations (1993 standardised wage rank >1)	ISCO 12 – Corporate managers	1.70	1.60
	ISCO 21 – Physical. mathematical and engineering professionals	1.43	1.47
	ISCO 22 – Life science and health professionals	1.22	1.39
	ISCO 24 – Other professionals	1.17	1.26
	ISCO 13 – Managers of small enterprises	1.15	0.93
Low paid occupations (1993 standardised wage rank <1)	ISCO 51 – Personal and protective service workers	-1.13	-1.05
	ISCO 93 – Labourers in mining. construction. manufacturing and transport	-1.22	-1.22
	ISCO 52 – Models. salespersons and demonstrators	-1.43	-1.50
	ISCO 91 – Sales and service elementary occupations	-1.68	-1.70

NB: Mean occupational wages weighted by weekly hours worked in each country. Unweighted average across countries. Values rescaled to mean zero and unit standard deviation.

Source: Goos et al. (2010).

This result can be confirmed by the considering EU-SILC ([20]) data available on the Eurostat website, and limiting the analysis to the four years which present more complete and reliable data (2005-08). The likelihood of being among the working poor ([21]) is particularly high for elementary occupations (18.8% compared to an average of 8.5%) and the ranking of working poor incidence remains unchanged during the four-year period. Although data available is relatively too small to obtain reliable results, we are allowed to assume that there is no evidence of wage polarisation in the European economy as a whole.

Increasing inequality leads to the question of imperfect mobility and labour-market segmentation ([22]). The causes of labour-market segmentation are many and varied. Stereotypes can play an important role, particularly for immigrants or gender segregation but other social or institutional factors can also have a profound influence on workers' ability to improve their conditions:

(a) low skills that would require extensive investment in training and qualifications;
(b) strict immigration laws;
(c) black economy and irregular labour markets in general;
(d) long-term unemployment;
(e) labour-market regulations that increase the probability of separating equilibriums among different groups ([23]).

([20]) The statistics on income and living conditions is the European Union reference source for comparative statistics on income distribution and social inclusion. It provides annual data for Member States, Iceland and Norway (http://epp.eurostat.ec.europa.eu).

([21]) EU-SILC provides data on population aged 18 and over by occupation and income group. According to Eurostat definition, we consider here 'low pay' a monthly income below 60% of median equivalised income.

([22]) Labour-market segmentation can be defined in terms of earnings mobility (coexistence of a significant share of workers stuck in low paid jobs and a large share of workers that experience earnings mobility within their own working life).When reasoning in terms of occupational mobility, persistence in low pay can be a necessary, but not sufficient, requirement.

([23]) When considering elementary occupations, different employment protection laws, collective bargaining, immigration laws, anti-discrimination and government intervention, can all play an important role.

When specific groups are trapped in low-paid segments of the labour market, irrespective of their qualification and skill level, one consequence is the alteration of labour cost differentials (considered in a broad sense), so that employees can be induced to overutilise some kind of occupations and/or worker groups. Also, given the observed trend towards a higher qualification shown by elementary occupations, to what extent can labour-market segmentation – in particular the excess of labour supply in specific segments – be considered a cause of polarisation? An analysis of elementary workers in terms of socio-demographic characteristics provides some first evidence in this direction.

5.1. Who are the elementary workers?

Available data allow us to distinguish occupations by main age groups, gender, education and nationality. Are there particular groups which are more involved than others in the increasing trend of elementary occupations? To what extent could this (possible) market segmentation contribute to explaining the (within sector) occupational polarisation? One way to answer these questions is to consider the rise in the share of elementary occupations by main socio-demographic characteristics.

Data for 2008 show the high incidence of non-national, lower educated and ageing workers compared to the average of the whole workforce (Table 6). However, the greatest increase from 2000 to 2008 occurred in the share of immigrant workers (+6%) and in medium-qualified workers (+9%). A certain increase can also be noted in the share of part-time workers and of older workers in total elementary occupations.

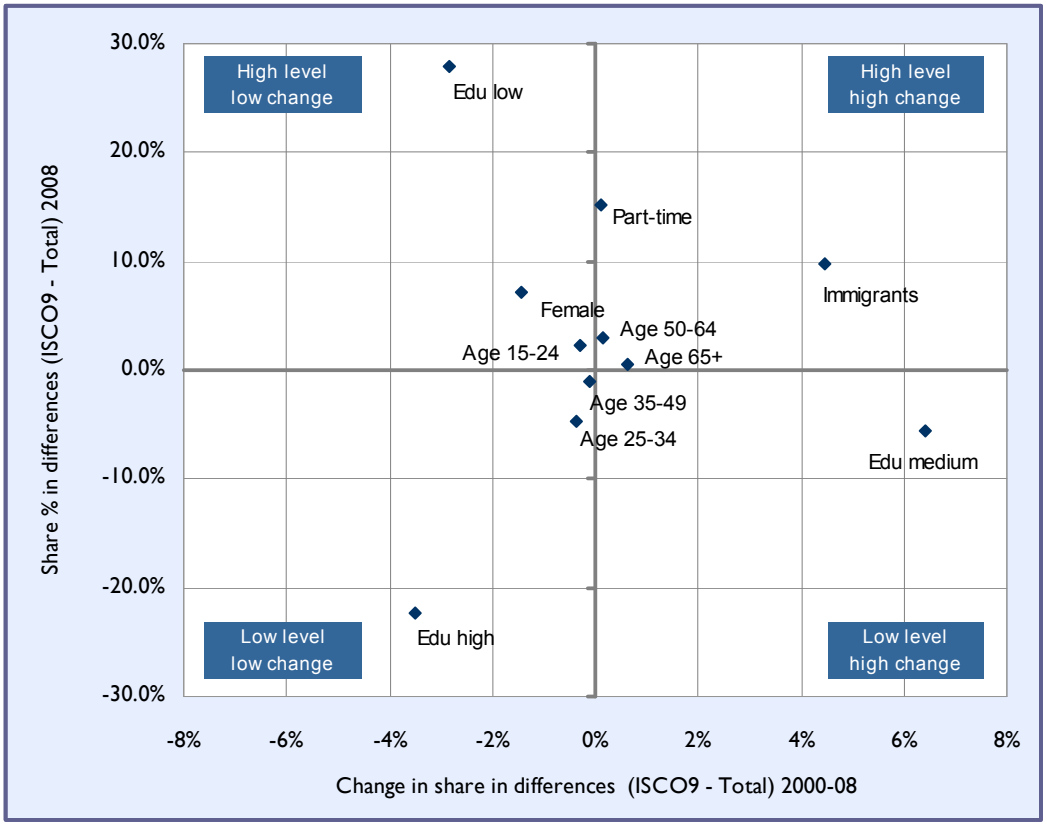
To understand these results it is necessary also to consider the general trends that affected employment as a whole. Figure 12 presents an analysis of differences in share (by age, gender, education and nationality), where the levels and changes in share by socioeconomic characteristics are calculated in differences from total employment. In this way it is possible to note not simply the changes which occurred during 2000-08, but also the shifts in relative labour demand for elementary occupations among different groups of workers.

Table 6. **Main characteristics of elementary workers**

(%)

	Share 2008		Change in share 2000-08	
	ISCO 9	Total occupations	ISCO 9	Total occupations
Non-national	17	7	6	1
National	83	93	-6	-1
Total	**100**	**100**		
Male	48	55	0	-1
Female	52	45	0	1
Total	**100**	**100**		
Full-time	66	82	-2	-2
Part-time	34	18	2	2
Total	**100**	**100**		
Edu Low	52	24	-9	-6
Edu Medium	44	49	8	1
Edu High	5	27	1	5
Total	**100**	**100**		
Age 15-24	12	10	-1	-1
Age 25-34	19	24	-3	-2
Age 35-49	40	41	0	0
Age 50-64	27	24	3	3
Age 65+	2	2	1	0
Total	**100**	**100**		

Figure 12. **Main socioeconomic characteristics in elementary occupations, in-differences analysis between ISCO 9 and total occupations EU-27***



Source: Eurostat, LFS – Reference age: 15+

The figure provides much interesting information about the role that individual characteristics of elementary workers play. For example, the distribution of elementary occupations by age appears quite similar to the average of total occupations, both in level and in change. In contrast, some differences can be noted in the share of part-time jobs and female workers (both above the average), although the latter are losing ground during the last decade. The share of part-time jobs remains high but tends to follow the same average trend exhibited by occupations as a whole.

However, the most significant results come from the analysis of nationality and education level. First, it is possible to confirm that the sharpest increase occurred in the incidence of immigrants and medium qualified workers, greatly exceeding all the other components. Further, both higher- and lower-educated workers are losing ground on the average occupation trends. These results require a deeper analysis of the role of immigration and qualification trends in polarisation.

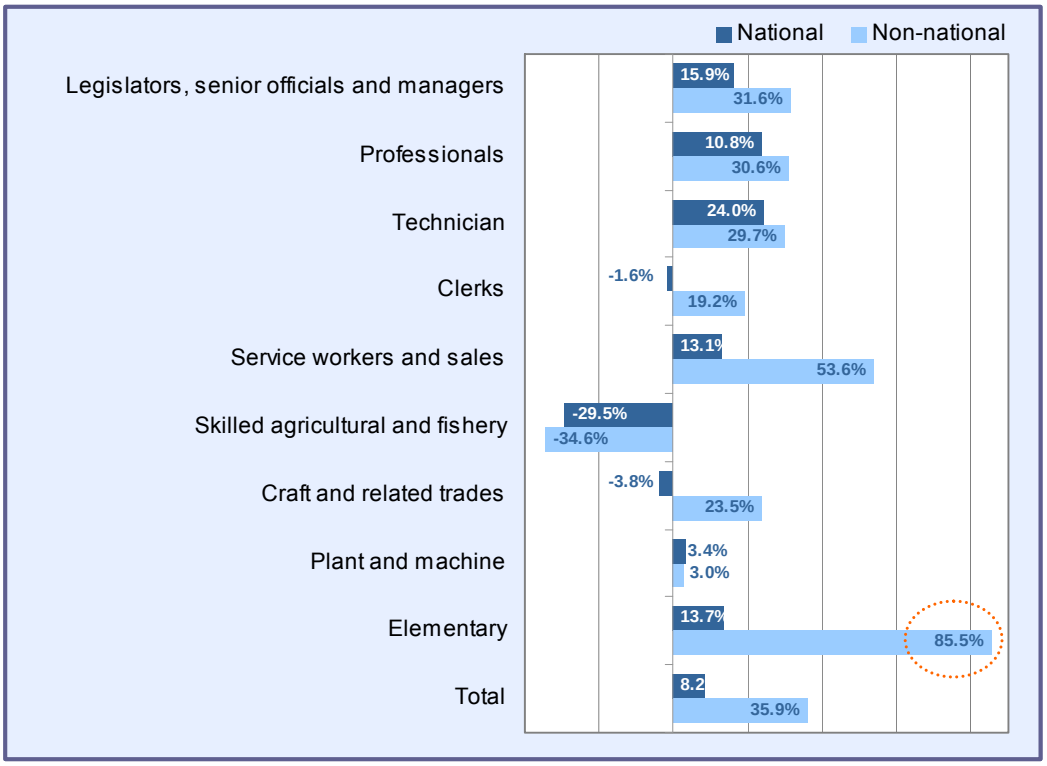
5.2. The role of immigration flows

Considering the percentage changes which occurred among the different groups, Figure 13 shows the strong increase in immigrant (non-national) workforce in almost all occupations (an average of +35.9% compared with +8.2% of the national workforce). Due to significant overall growth, a negative trend is observed only in ‘skilled agricultural and fishery’. However, the rate of increase is extremely high for elementary occupations (+85.5%) and ‘service workers and shop and market sales’ (+53.6%).

Although relative change in percentage does not reflect the absolute dimension of the trends, the impact of immigration on elementary occupations is quite relevant. To consider the relative magnitude of the phenomenon, Figure 14 shows the change in shares of occupations which occurred during the last decade, broken down into national and non-national workers.

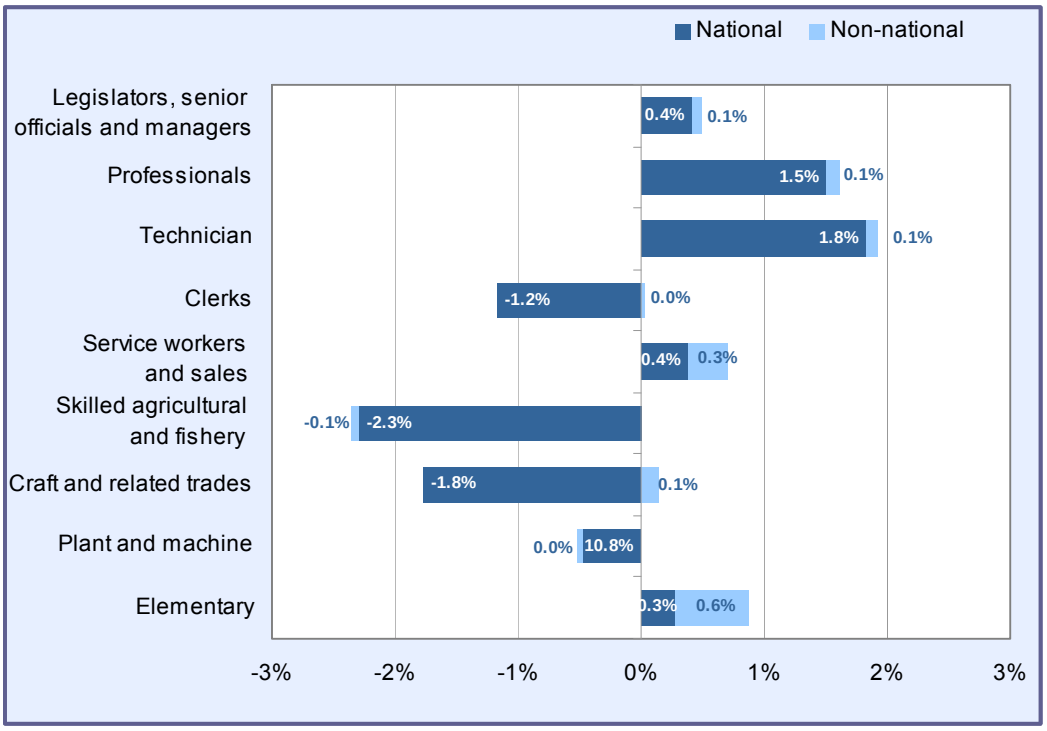
Elementary occupation is the unique group where the immigration component is not only relevant but also prevails on the national component. At the end of the period, the share of immigrants in elementary occupations reaches 16.6%, much higher than in the other occupations (5.8% on average).

Figure 13. **Change % in employment by occupations and nationality, EU-27*, 2000-08**



Source: Eurostat, LFS – Reference age: 15+

Figure 14. **Occupations as % share of total employment. Change in percentage points, EU-27*, 2000-08**



Source: Eurostat, LFS – Reference age: 15+

It is not a surprising result. Several studies highlighted some relevant supply-side effects of labour related to immigration (Biffl, 1996):

(a) higher allocative efficiency: immigrants usually have a lower reservation wage and are more willing to move among different local labour markets;
(b) lower substitutability: immigrants tend to concentrate within certain labour-market segments, especially those with low qualifications;
(c) dampening effect on wages: the abundance of low-skilled immigrants encourages employers to use labour-intensive rather than human capital intensive or capital intensive production methods;
(d) training cost-saving: the abundance of high-skilled immigrants can provide an advantage in terms of training and education costs.

The combination of the first three factors offers a key to interpretation for a significant part of the overall phenomenon. If we also consider the peculiar socioeconomic characteristics of immigrants and the institutional factors that tend to segregate part of the non-national workforce, than we can assume that a supply-side effect related to migration can play a significant role in polarisation.

5.3. Low-skilled, more qualified?

A further confirmation of the above hypothesis can be found when addressing the second point related to the evidence of a strong increase in workforce qualification within elementary occupations. Although formal qualification is merely a proxy of the knowledge, skills and competences required to perform certain occupations, there is some correlation between levels of formal qualification and professional needs.

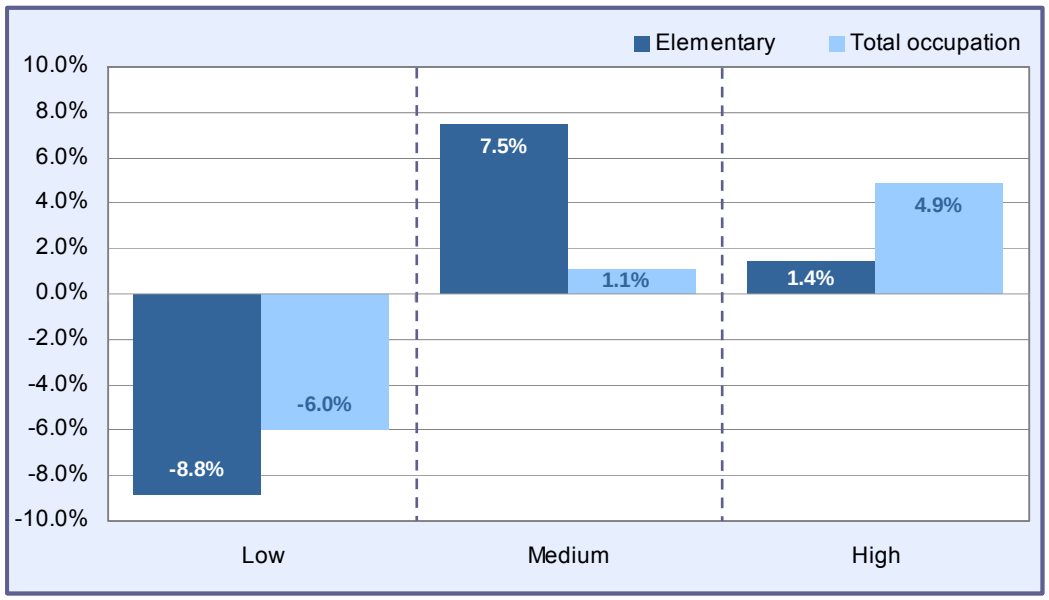
Overall, the occupational structure which emerged during the last decade seems to require mainly people with intermediate (12%) and high qualifications (34%), while job opportunities for those with low levels of education decreased (-13%). In the same period, in elementary occupations the low qualified increased by 4%, the medium qualified by 47% and the high qualified 72%. But these trends are also the consequences of the overall change (22% for elementary occupations compared to an average of 9% for the other occupations) and of the initial levels of qualification (in 2000 the share of high qualified in elementary occupations was only 5% compared to 25% of the other occupations).

To compare the different trends properly, Figure 15 shows the change in share of qualification within elementary occupations and total employment.

Within the elementary occupations, although the share of medium qualification is substantially increased even in relative terms, expansion of highly qualified workers is virtually static compared to the overall trend (only 1.4 to 4.9 percentage points). As a result, the share of workers with low qualification has fallen very quickly for elementary occupations but not at a significantly greater rate than the average of other occupations. When focusing on low qualifications, we can

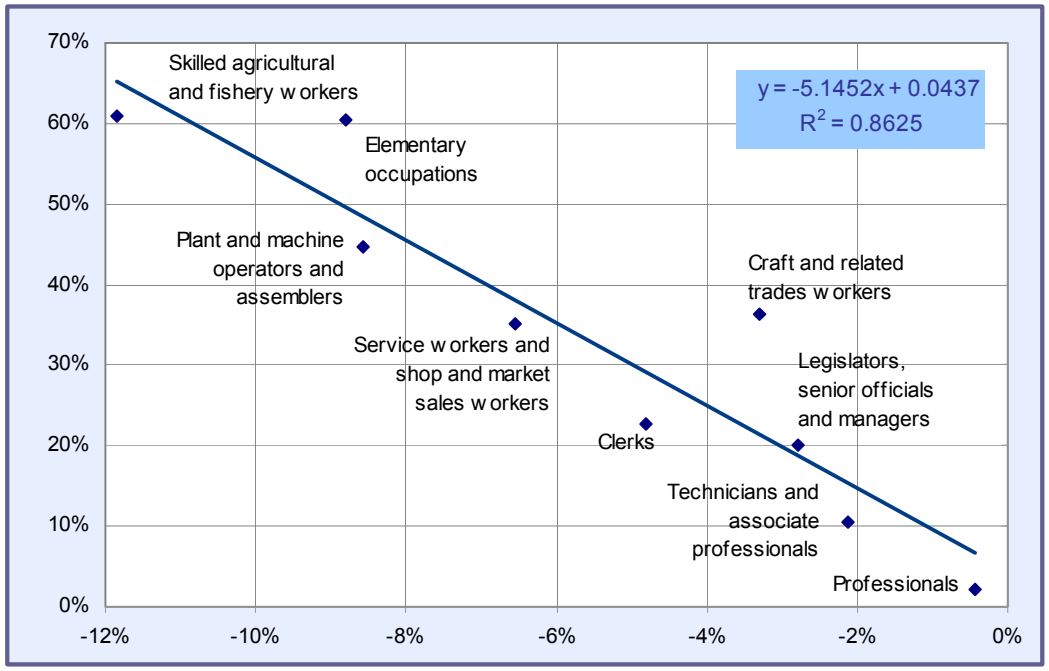
highlight a strong correlation between change in share and initial level of qualification. In Figure 16, the observed changes from 2000-08 imply a clear trend toward a reduction in the disparities between qualification levels across occupations.

Figure 15. **Change in share of occupation by qualification, EU-27*, 2000-08**



Source: Eurostat, LFS – Refence age 15+

Figure 16. **Share of low qualified workforce by occupations. Correlation between level 2000 and change 2000-08**



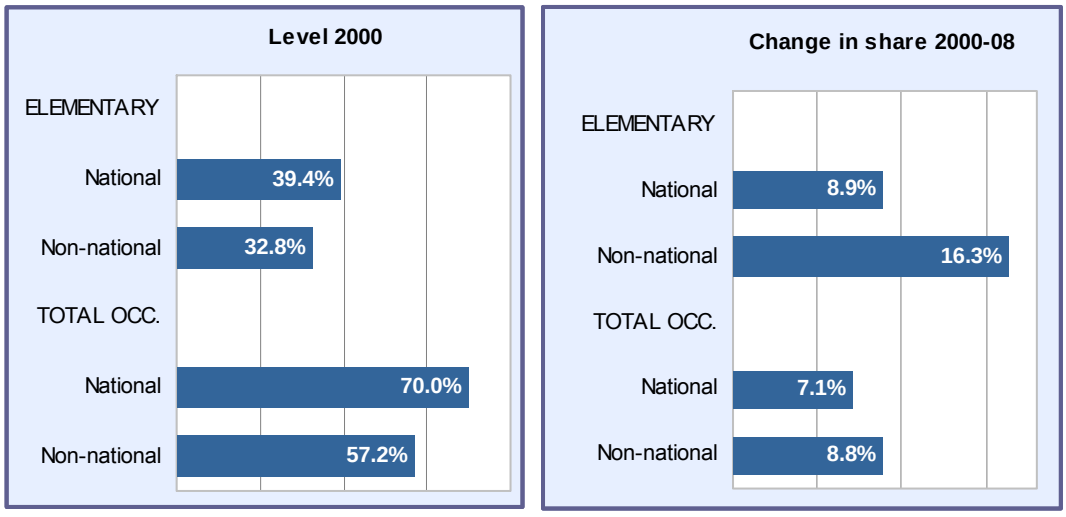
Source: Author, based on Eurostat LFS.

5.4. Underutilisation versus over-education

The hypothesis that supply-side trends in qualification can anticipate variation in occupational change is based on the idea that employers' decisions take into account the availability of input factors. When economic wealth, cultural factors or specific public policies tend to increase the schooling and qualification of the population, irrespectively of current production needs, this can encourage employers to change their production techniques and substitute low-skilled with high-skilled labour. There is huge and contrasting literature about the relevance of this phenomenon. The pessimistic view highlights the risk of over-education and social and private over-investment in human capital. The optimistic view points out the positive, long-term effect of the upgrading on innovation, productivity and economic growth ([24]). However, data on nationality also supports the idea that, in the specific case of elementary occupations and labour-market segmentation, consequent misallocation of labour across occupations could also play a relevant role.

Figure 17 shows that observed trends are significantly differentiated between the national and non-national workforce. While the increase in medium and high qualifications in national elementary workers is quite close to the average of total employment, for immigrants the share of medium and high qualification increases at almost double the average pace.

Figure 17. **Share of medium and high qualifications in total employment, EU-27*, 2000-08**

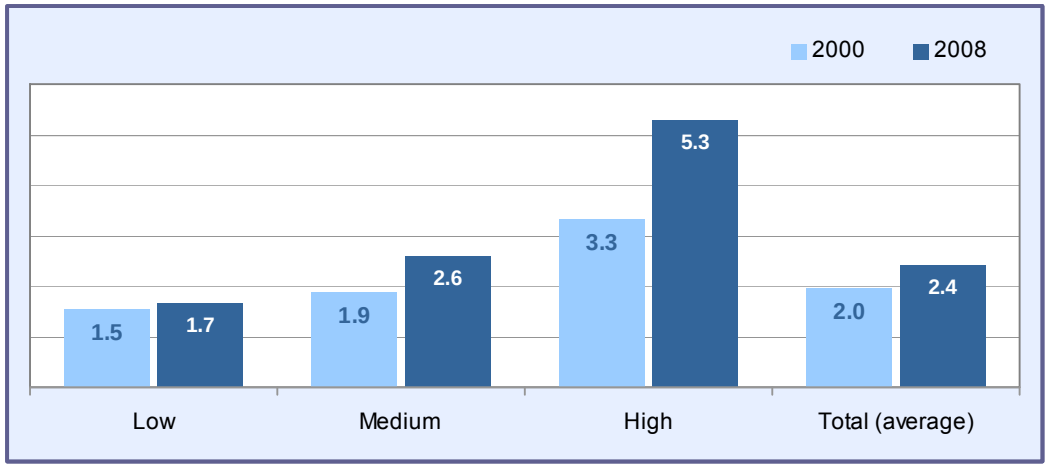


Source: Author, based on Eurostat LFS.

([24]) Here we consider the skill-biased hypotheses as a separate case. The attention is on the labour-supply side (over-education or upgrading) rather than on the labour-demand side (higher skills required as a consequence of technological/ organisational progress and/or changes in work content).

Further evidence of immigrants' difficulties to find job matching their qualifications, emerges when considering the workforce level of qualification by occupation. Figure 18 shows the ratio between non-national and national workers by qualification levels, comparing elementary occupations with the overall employment average ([25]). Not only non-national workers are concentrated in elementary occupations (2.4 times more than national workers), but also the index rapidly increases with the level of education, peaking at 5.3 for the highly-educated non-national workers.

Figure 18. **Concentration index of non-national workers in elementary occupations by qualification, EU-27*, 2008**



Source: Eurostat, LFS – Reference age: 15+

Various explanations can be given to account for this phenomenon. There is some evidence, for example, that employers tend to value education and experience in the host country (EIU, 2009). Also, what is referred to as over-education actually can be the result of differences in skills and competences among individuals with the same qualification level ([26]). However, it is also reasonable to come to a diagnosis of underutilisation rather than over-qualification of the workforce. The term 'underutilisation' is used here in opposition to 'over-qualification' to underlie that, in this case, the causes of educational mismatch should be traced back to segmentation of the labour market rather than to an excess supply of skilled labour.

([25]) The concentration index is obtained as the ratio between the share of employees on a given qualification level (QL) calculated on an individual component (in this case the non-national workers) and the share of employees on the same qualification level for all occupations. If QL >1 (or <1) the component in question (non-national) has a relatively higher (or lower) concentration of employees with the qualification level in question compared with all occupations.

([26]) When considering educational mismatches, several studies come to different conclusions on the role of unobserved heterogeneity. See e.g. Bauer (2002) for Germany; Martins (2004) for Portugal; McGuinness and Sloane (2009) for UK; Mavromaras et al. (2009) for Australia; Lamo and Messina (2010) for Estonia. For a comprehensive approach see Cedefop (2010b).

A phenomenon that can be explained in relation not only to stereotypes or cultural gaps and discrimination, but also to some developments of labour-market institutions. Migration regulations (but also flexible jobs and internal-external labour markets) can tend to limit market power and choice capacity especially in the case of particular segments of the workforce such as immigrants ([27]). It is worth underlining that in 2008 about 33% of the tertiary-educated workers in elementary occupations were immigrants compared to 6% on average for other occupations.

In this context, can we affirm that increasing formal qualification of low-skilled jobs depends on some changes in content of elementary occupation? Are elementary workers requiring a higher level of some core or generic skills typically ensured by higher level of formal qualification?

It is not yet possible to give definite answers. According to wide literature, the explanation is at least twofold. Part of the increase in certain professions is likely to require skills usually developed through an education level higher than compulsory schooling. Particularly in personal services, increasing demand for some generic or soft skills and the 'emotional labour' can provide evidence in this respect. At the same time, our data suggest that education upgrading of elementary occupations could be largely a result of a general increase of the workforce qualification. In a nutshell, this trend is likely the result of a joint effect of the demand and supply side, both consistent with the task-biased version of the SBTC hypothesis and the long-term evolution of increasing qualification of the population. However, the above analysis also shows that the hypothesis of labour-supply effect – favoured by socio-demographic and institutional factors – seems to provide a relevant explanation.

([27]) Alongside increasing labour market segmentation, a sub-segmentation between those with competitive and mobile skills and those with no competitive resources is also likely to occur.

CHAPTER 6
Conclusion

What can the analysis of past trends say about the potential role of elementary occupations in the future European labour market? Much of the occupational polarisation in Europe can be traced back to three factors: macroeconomic and structural changes (between sectors); the demand-driven increase in specific service activities (e.g. private household); and the increasing labour supply of non-national workers. In light of the continuous shift towards a tertiary-based economy, together with the predictable changes in consumption models and lifestyle of European societies, it is likely that a relative increase in elementary occupations is bound to persist in the near future.

Several predictable socioeconomic changes (ageing, family fragmentation, higher participation rate of women, increasing income inequality, changes in lifestyle, economic growth) will continue to increase the relative importance of certain sectors and professions that require skills that are usually – but not necessarily – developed through an education level higher than compulsory schooling. Often the level of formal qualification is not the crucial point: particularly in personal services, the increasing demand for generic or soft skills and 'emotional labour' can provide evidence of this (Cohen, 2010). Many service sectors such as social care – but also frontline services, call centres, beauty therapy, etc. – often involve communication and problem-solving skills, as well as developing empathetic relationships between the service provider and the customer ([28]). Soft and generic skills can often be more easily associated with a higher education level; however, vocational education and training (also on-the-job and mid-career) should be considered as a more cost-effective way to provide them and to keep workers up to date with fast-changing requirements that characterise these occupations.

In contrast, technological progress and/or work content changes seem to play a minor role. On one side, there are many service sectors where 'qualitative' innovations have little to do with technology. On the other, although the routinisation hypothesis is potentially significant, when approaching occupation polarisation focusing on elementary occupations, other factors – whether institutional or socio-demographical in nature – appear to offset and/or assume a greater explanatory value. It is worth focusing on the two main items from the analysis to understand better. First, over 70% of employment growth in high-qualified elementary workers is attributable to non-national workers. Second, 'private household' is the only growing sector where the share of elementary occupations increases and polarisation takes off. They are two specific and mutually related areas of the

([28]) With reference to the social care sector, see Cedefop (2010c) and Eurofound (2006).

labour market, both on the demand and the supply side, where the labour-market is peculiar and regulation particularly low.

Immigration regulation, flexible working, undeclared work, and self-employment are all factors that can modify the opportunity-cost of labour, as in the probability that a person decides to accept a specific occupation. For elementary occupations, labour-market segmentation and/or segregation tend to characterise many elementary occupations described as 'lousy' jobs (low paying, few opportunities and no benefits) even when that should not be the case. It is likely that better and more inclusive labour-market and migration policies would reduce the 'low-cost' workforce which has no other option than to work in simple jobs ([29]). This would induce employers to switch to production techniques that use more higher-skilled workers and/or to rely on more capital-intensive production methods. As a consequence, the share of elementary occupations within some sectors – such as household services – would decrease. Specific policies, including vocational education and training, could drive a process of occupational upgrading in the future, and counteract the polarisation trend. In the absence of new policies and institutional changes, elementary occupations would probably increase, becoming even less attractive to the local population. In this scenario, the share of immigrants in elementary occupations is bound to increase.

This study is a first step towards full understanding of occupational polarisation and its causes. Its trends are quite diversified across countries and sectors, requiring tailored policy responses. For this reason, further and more structured analyses are needed to distinguish the different patterns across EU Member States, sectors and occupations, and to assign a specific magnitude to the different possible causes. At the same time, when addressing elementary occupations – involving both workers and employers, often marginal to the labour market – a more qualitative and institutionally oriented approach could certainly support better understanding of polarisation in Europe. First, data on occupations provide us with limited information on actual skill requirements and tasks performed within specific activities. The continuing work on ESCO ([30]) can contribute to filling this gap and national, European and other international surveys on qualifications, skills and other job requirement can be analysed ([31]). Second, it would also be important to analyse differences in polarisation trends across countries and sectors in light of different institutional contexts. Cultural factors, labour-market regulations and immigration laws, can limit occupational choices of specific groups leading to inefficient occupational structure and unfair distribution.

([29]) We are focusing here on immigrants but similar considerations would apply to disadvantaged and/or discriminated groups more generally.

([30]) ESCO is the European taxonomy of skills, competences and occupations. The aim of the Commission initiative is to complement and link national/sectoral taxonomies developing a multilingual European standard terminology and classification on skills and competences (http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=852).

([31]) A reference point is the long-lasting O*NET experience in the US, but also the skills survey in the UK or the organisation, learning and competences survey in Italy.

Abbreviations

E3ME	energy-environment-economy model of Europe
ECHP	European Community household panel
EU-27*	27 EU Member States plus Switzerland and Norway
EU-SILC	European Union statistics on income and living conditions
IER	Warwick Institute for Employment Research
ISCED	international standard classification of education
ISCO	international standard classification of occupations
LFS	labour force survey
SBTC	skill biased technological change
TBTC	task biased technological change

Country codes

BE	Belgium
BG	Bulgaria
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary

MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom
NO	Norway
CH	Switzerland
US	United States

ANNEX
Classifications and aggregations

A. Statistical classification of economic activities in the European Community, Rev.1.1 (2002) (NACE Rev.1.1)

Code	Description
A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
CA	Mining and quarrying of energy producing materials
CB	Mining and quarrying, except of energy producing materials
D	Manufacturing
DA	Manufacture of food products, beverages and tobacco
DB	Manufacture of textiles and textile products
DC	Manufacture of leather and leather products
DD	Manufacture of wood and wood products
DE	Manufacture of pulp, paper and paper products; publishing and printing
DF	Manufacture of coke, refined petroleum products and nuclear fuel
DG	Manufacture of chemicals, chemical products and man-made fibres
DH	Manufacture of rubber and plastic products
DI	Manufacture of other non-metallic mineral products
DJ	Manufacture of basic metals and fabricated metal products
DK	Manufacture of machinery and equipment n.e.c.
DL	Manufacture of electrical and optical equipment
DM	Manufacture of transport equipment
DN	Manufacturing n.e.c.
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social and personal service activities
P	Activities of households
Q	Extra-territorial organisations and bodies

B. International standard classification of occupation (ISCO-88)

HIGH SKILLED	Major group 1: legislators, senior officials and managers	
	11	Legislators and senior officials
	12	Corporate managers
	13	Managers of small enterprises
	Major group 2: professionals	
	21	Physical, mathematical and engineering science professionals
	22	Life science and health professionals
	23	Teaching professionals
	24	Other professionals
	Major group 3: technicians and associate professionals	
	31	Physical and engineering science associate professionals
	32	Life science and health associate professionals
	33	Teaching associate professionals
	34	Other associate professionals
SKILLED NON-MANUAL	Major group 4: clerks	
	41	Office clerks
	42	Customer services clerks
	Major group 5: service workers and shop and market sales workers	
	51	Personal and protective services workers
	52	Models, salespersons and demonstrators
SKILLED MANUAL	Major group 6: Skilled agricultural and fishery workers	
	61	Skilled agricultural and fishery workers
	Major group 7: craft and related trades workers	
	71	Extraction and building trades workers
	72	Metal, machinery and related trades workers
	73	Precision, handicraft, craft printing and related trades workers
	74	Other craft and related trades workers
	Major group 8: plant and machine operators and assemblers	
	81	Stationary plant and related operators
	82	Machine operators and assemblers
	83	Drivers and mobile plant operators
ELEMENTARY	Major group 9: elementary occupations	
	91	Sales and services elementary occupations
	92	Agricultural, fishery and related labourers
	93	Labourers in mining, construction, manufacturing and transport
	Major group 0: armed forces	

C. International standard classification of education (ISCED 97)

Main groups	LOW education: ISCED 0, 1, 2 and 3C short MEDIUM education: ISCED 3C long, 3A, 3B and 4 HIGH education: ISCED 5 and 6
ISCED 0: pre-primary education	
Programmes at level 0 (pre-primary education), defined as the initial stage of organised instruction are designed primarily to introduce young children to a school-type environment, to provide a bridge between the home and a school-based atmosphere.	
ISCED 1: primary education or first stage of basic education	
Programmes at level 1 (primary education), are normally designed on a unit or project basis to give students a sound basic education in reading, writing and mathematics along with an elementary understanding of other subjects such as history, geography, natural science, social science, art and music.	
ISCED 2: lower secondary education or second stage of basic education	
The contents of programmes at level 2 (lower secondary education) are typically designed to complete the provision of basic education which began at ISCED level 1. The end of this level often coincides with the end of compulsory schooling where it exists.	
ISCED 3: upper secondary education	
This level of education typically begins at the end of full-time compulsory education for those countries that have a system of compulsory education. The educational programmes included at this level typically require the completion of some nine years of full-time education (since the beginning of level 1) for admission or a combination of education and vocational or technical experience. Three different programme destinations are provided: ISCED 3A: programmes designed to provide direct access to ISCED 5A; ISCED 3B to ISCED 5B; ISCED 3C programmes not designed to lead to ISCED 5A or 5B. The level ISCED 3C short (shorter than 2 years) is considered as lower secondary education while the level ISCED 3C long is considered as upper secondary.	
ISCED 4: post-secondary non-tertiary education	
ISCED 4 captures programmes that straddle the boundary between upper secondary and post-secondary education from an international point of view, even though they might clearly be considered as upper secondary or post-secondary programmes in a national context. Typical examples are programmes designed to prepare students for studies at level 5 who, although having completed ISCED level 3, did not follow a curriculum which would allow entry to level 5, such as pre-degree foundation courses or short vocational programmes.	
ISCED 5: first stage of tertiary education (not leading directly to an advanced research qualification)	
Entry to these programmes normally requires the successful completion of ISCED level 3A or 3B or a similar qualification at ISCED level 4A or 4B. ISCED 5A: programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and professions with high skills requirements. ISCED 5B: Programmes at the tertiary level that focus on practical, technical or occupational skills for employment in a particular occupation or class of occupations.	
ISCED 6: second stage of tertiary education (leading to an advanced research qualification)	
This level is reserved for tertiary programmes which lead to the award of an advanced research qualification. The programmes are devoted to advanced study and original research and not based on course-work only. They typically require the submission of a thesis or dissertation of publishable quality which is the product of original research and represents a significant contribution to knowledge.	

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European countries continue to experience significant changes in their economic and occupational structures, exposing workers and firms to rapidly evolving knowledge, skills and competence needs. From 1998 to 2008, an occupational polarisation emerged for the first time in Europe, with a concomitant rising demand at the upper and lower ends of the occupational skill distribution. In this paper, particular attention is given to elementary occupations. Much of the phenomenon can be traced back to macroeconomic trends and structural changes between sectors. The increasing labour supply of non-national workers, and some institutional characteristics, are also likely to be significant explanatory factors. In contrast, technological progress and/or work content changes seem to play a minor role., A more qualitative and institutionally oriented approach would contribute to better understanding of the phenomenon and to assessing whether a relative increase in elementary occupations will persist in the near future.

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