SECTORAL CHANGE AND IMPLICATIONS FOR OCCUPATIONAL MISMATCH IN SPAIN

The authors of this article are Aitor Lacuesta, Sergio Puente and Ernesto Villanueva of the Directorate General Economics, Statistics and Research.

Introduction

The level of unemployment in an economy depends on a broad set of factors, noteworthy among which are institutional considerations having to do with labour market regulation. This article focuses, however, on the difficulty of the unemployed in meeting the skill requirements of the jobs available. The reason for analysing this issue in the Spanish economy is because, of the more than 2.5 million jobs destroyed since the onset of the crisis, nearly 1.5 million have been in the construction sector, the weight of which in total employment shrank from 13 % in 2007 to 7 % at end-2011.[1] Given that this sector cannot be expected to recoup the same level of activity as in the past, it is important to analyse the future employability of jobless construction workers.

In this connection, the economic literature on human capital formation emphasises that the future employability of those who have lost their jobs depends mainly on the specific skills learned during their work experience, and only to a lesser extent on the economic sector in which they worked before they became unemployed. In particular, this literature finds that the type and transferability of workers' skills plays an important role in explaining the differences in growth between the USA and Europe [Wasmer (2004)], the higher unemployment in Europe than in the USA [Ljungqvist and Sargent (1998)] and the recent growth in wage inequality [Gavilán (2012), Autor and Dorn (2009)].

Following this approach, the present article analyses to what extent the mismatch between the occupations and skills of the employed and unemployed may help to explain the higher unemployment rate in Spain than in the rest of the EU. To do this, we look at the degree of similarity between the past occupations of the unemployed and the newly created ones. The main assumption of the article is that the greater the difference between these occupations, the lower the likelihood of finding a job and, therefore, the greater the significance of the role played by active labour market policies designed to bring the qualifications of the unemployed into line with those required by the labour market.

To carry out the work reported here, two alternative methods were used. First, the distribution of occupations in the economy in 2011 was analysed, which enabled us to classify workers into different groups (managers, professionals, technicians, etc.) and to compare this distribution of occupations in employed and unemployed people. The essential assumption in this exercise is that it is more costly to change one's occupation, even in the same sector, than to work in the same occupation in a different sector. Thus the likelihood that an unemployed person with experience in a certain occupation will find a job rises with increasing number of vacancies in that occupation in any productive sector.

The second method assumes a certain labour mobility between occupations, insofar as the specific skills required in different occupations may show some similarity. For example, unemployed persons with experience in a certain occupation and sector requiring contact with the public might find work in a different occupation and/or sector requiring that same

1 This percentage is practically the same as the historical low, recorded in 1985 following the crisis of the early 1980s, of the time series which has been compiled since 1976.

SECTORAL STRUCTURE IN SPAIN BEFORE AND AFTER THE CRISIS TABLE 1

% GDP

	Spain		Euro area		Spain-euro area difference 2008	Change (Spain)	Spain-euro area difference 2011
	2008 Q1	2011 Q4	2008 Q1	2011 Q4	2008 Q1	2011-2008	2011 Q4
Construction	13.1	7.2	8.4	7.3	4.7	-5.9	0.0
Wholesale & retail trade, transport and accommodation & food service activities	27.2	28.7	23.9	23.8	3.3	1.5	4.9
Domestic service	3.7	3.7	1.6	1.8	2.1	0.1	1.9
Agriculture, forestry and fishing	4.2	4.5	3.3	3.2	0.9	0.3	1.3
Other market services (a)	18.0	19.2	19.8	20.2	-1.8	1.2	-1.0
Industry	16.3	14.2	18.7	18.0	-2.4	-2.1	-3.8
Non-market services (b)	17.5	22.3	24.2	25.6	-6.7	4.9	-3.3

SOURCES: Eurostat and Banco de España.

a These comprise groups J, K, L, M, N, R and S of the CNAE-2009. Group U is included in non-market services.
b Government, education, health care and social services.

skill. In this case, the employment possibilities of a person with past experience in occupations requiring certain skills will increase in proportion to the number of job vacancies requiring that skill, regardless of the sector.

Sectoral change in the Spanish economy and size of the occupational mismatch between the unemployed and the employed

Since 2008 the Spanish economy has undergone a huge change in its productive specialisation. This contrasts with the euro area, where the sectoral composition of employment has scarcely varied (see Table 1). In Spain the fall in the weight of construction has shifted its relative importance towards that of this sector in the euro area. The weight of the wholesale & retail trade, transport and accommodation & food service activities sectors, which was relatively high in Spain in 2008, has continued to rise during the crisis. Meanwhile, the industrial sector, which had a lower weight, has continued to lose relative importance since the onset of the crisis.

These changes in sectoral composition and, in particular, the concentration of job losses during the crisis in sectors such as construction, with a high percentage of unskilled workers, pose significant challenges to their future employability. Table 2 shows the distribution by occupation of employment and unemployment at end-2011[2] in Spain, in the euro area and in three European countries. It can be seen that generally lower-skilled workers are over-represented in unemployment in all countries, although the weight of unskilled workers among the unemployed is particularly high in Spain (nearly 30 %). Also, the table shows that the Spanish productive structure is, compared with other European economies, skewed towards unskilled work, which accounts for somewhat more than 13 % of total employment.

Quantified below are the occupational differences between the unemployed (whose occupation is taken as that of the last job held) and the employed.[3] This was done by calculating a similarity index which takes values between 0 % (no similarity) and 100 % (full

2 The occupation of the unemployed is that of their last job. This information is only available for those who have been unemployed for less than one year. For others, the same distribution of occupations has been assumed. The results do not vary when the same exercise is carried out under the assumption that the distribution of occupations of those unemployed for more than one year is the same as that of those unemployed for less than one year in 2010 Q4 or in 2009 Q4.

3 It was decided to conduct a one-digit study to enable a certain transferability between occupations which do not seem to be very different, even if they are in different two-digit groups. In principle, this seems more important for unskilled occupations.

OCCUPATIONAL DISTRIBUTION OF THE EMPLOYED AND THE UNEMPLOYED TABLE 2

% of GDP

CNO-2011 occupations	Spain		Euro area		Germany		Italy		United Kingdom	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Armed forces occupations	0.0	0.5	0.0	0.7	0.0	0.4	0.0	1.2	0.0	0.3
Managers	1.1	5.1	1.6	5.5	1.6	5.0	0.5	3.6	5.5	10.1
Professionals	6.1	16.2	6.8	16.8	6.8	17.5	5.0	13.2	15.3	23.7
Technicians and associate professionals	7.0	10.9	8.3	17.1	8.3	20.3	10.0	17.3	8.9	11.6
Clerical support workers	6.5	10.2	8.5	10.9	8.5	12.1	8.7	12.7	9.6	10.5
Service and sales workers	23.7	21.5	23.6	17.1	23.6	15.4	27.0	16.1	24.9	19.2
Skilled agricultural, forestry and fishery workers	1.7	2.6	2.0	2.9	2.0	1.5	1.8	2.5	1.5	1.2
Craft and related trades workers	18.0	12.0	18.1	12.1	18.1	12.6	20.0	15.3	10.4	9.3
Plant and machine operators, and assemblers	6.7	7.8	7.5	7.0	7.5	6.5	7.3	7.3	5.0	4.5
Elementary occupations	29.4	13.2	23.6	9.8	23.6	8.7	19.6	10.8	18.9	9.7
Similarity of occupational structure of employment and unemployment (a)	87.5		85.1		80.8		89.1		92.8	

SOURCES: Eurostat and Banco de España.

a For each country, the similarity of the productive structure of employment and unemployment is defined as $I = (\Sigma op \cdot oe)/(\Sigma op^2 \cdot \Sigma oe^2)^{1/2}$ where op and oe are two vectors which describe the percentage of workers in the different one-digit occupations of the CNO-2011 for the unemployed and the employed, respectively.

equality).[4] Chart 1 plots this index since 2000, while the last row of Table 2 gives the values at end-2011. The occupational distributions of the employed and the unemployed have become less similar since the crisis began, although not sufficiently so to counteract the increase in similarity at the beginning of the past decade. Also, in relative terms, the degree of similarity between the occupations of the unemployed and the employed in Spain does not differ from that in other European countries. Thus the high weight of unskilled unemployed persons is offset because the unskilled are also over-represented among the employed. Indeed, the aforementioned sectoral change in Spain has not significantly increased the mismatch between the occupational profiles of the unemployed and the employed.

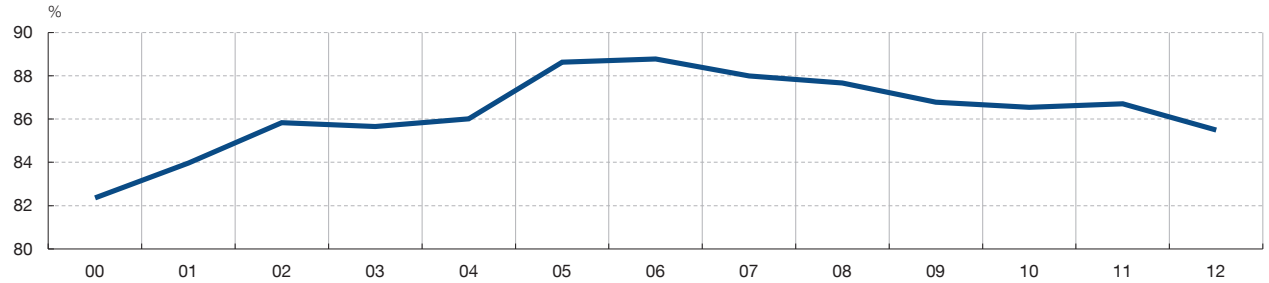
It should, however, be taken into account that this similarity index examines only the potential for shifts between unemployment and employment determined by the degree of similarity of the distribution of occupations in the two groups. Hence this analysis should be supplemented by a study of individual shifts between unemployment and employment based on the previous occupation of the unemployed.[5]

4 Specifically, the index measures the angular separation between the two distributions. See Gathmann and Schönberg (2010). The one-digit analysis by occupation gains in aggregation and compression of results, although it inevitably entails that, for example, a professional in the medical area can be replaced by an engineering professional. To remedy this problem, the same exercise can be carried out at a greater level of disaggregation, but this solution is not exempt from problems, since in this case an agricultural labourer would not be replaceable by a construction labourer.

5 In this respect, Gathman and Schönberg (2010) report for Germany a correlation between the inter-sectoral movements of workers and the sectoral similarity indices calculated on the basis of skills. For Spain, some preliminary results also point to a positive association between the probability of changes in employment between sectors and their degree of occupational similarity. Meanwhile, the recent decrease in the flow out of unemployment into employment, estimated using EPA flow data, coincides with the fall shown in the similarity index, which may indicate a certain relationship between these two variables.

OCCUPATIONAL SIMILARITY BETWEEN THE EMPLOYED AND THE UNEMPLOYED CHART 1

INDEX OF SIMILARITY BETWEEN THE UNEMPLOYED AND THE EMPLOYED



SOURCE: Banco de España.

Transferability of skills

The above approach assumed that the skills acquired in different occupations are not mutually interchangeable. For example, assume a worker employed as a professional or technician cannot take on the tasks of a company manager, even though both occupations require a specialisation in IT, organisational and presentational tasks. It would thus be of interest to consider the type of skills used by the unemployed in their previous jobs. If these skills are in demand in jobs in other sectors, an unemployed person's chance of finding work would be greater.

The O*NET database[6] allows the skills required in the various occupations to be calculated.[7] Table 3 shows that all occupations require, to a greater or lesser extent, the use of all skills. That said, there are differences in the intensity of use of each. Thus, for example, managerial posts require a higher level of cognitive and analytical skills, while occupations involving contact with the public, such as those associated with accommodation & food service activities and personal services, are relatively intense in communicative skills. Meanwhile, machine operators require manual skills in particular.

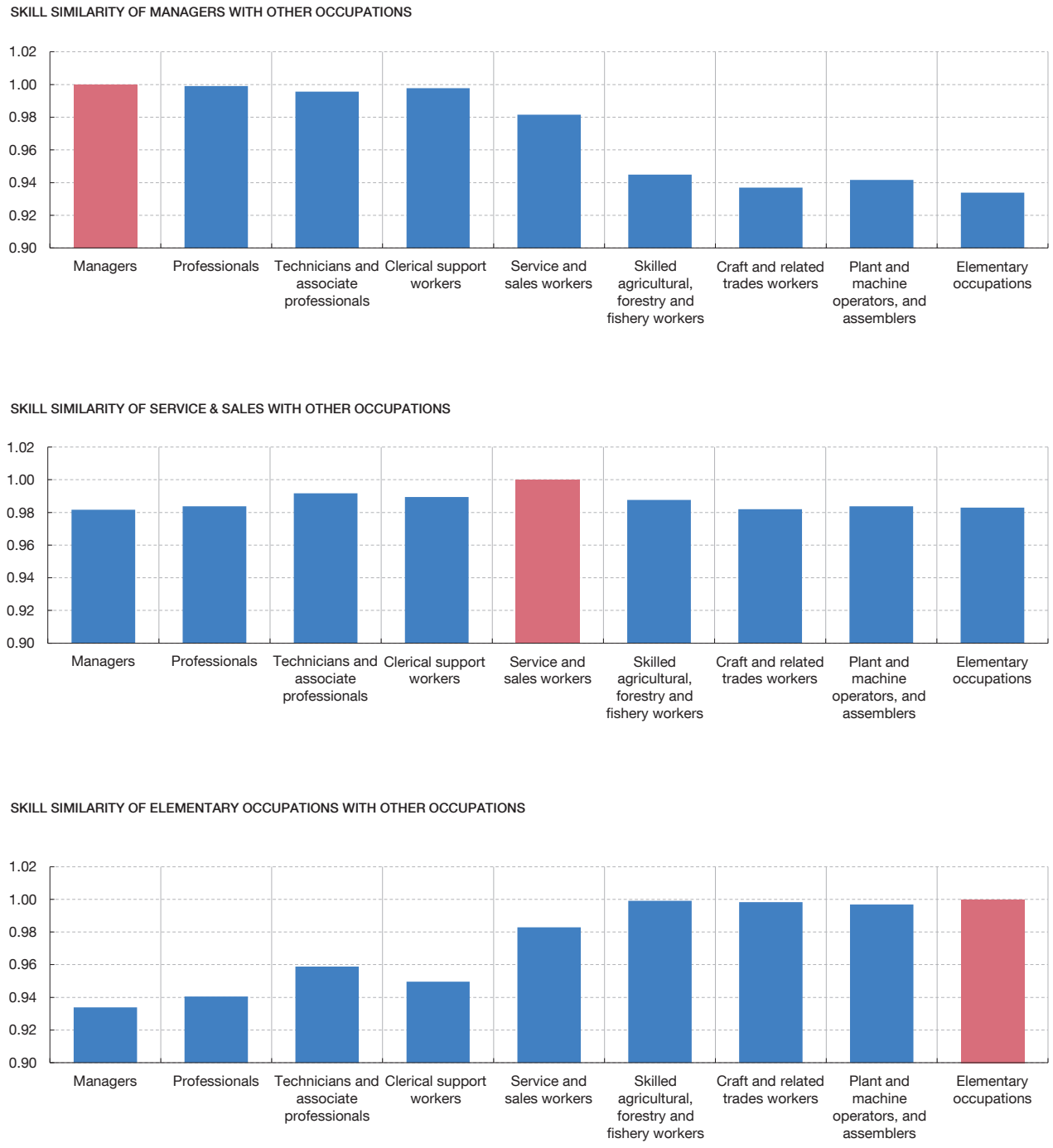
Once the various skills used in each occupation have been estimated, the next step is to analyse which of these occupations are most similar to each other. An index such as that defined in the preceding section, which takes a value of 100 when two occupations require exactly the same skills and zero if none of the skills used in an occupation is required in the second one, allows occupations to be classified into three broad groups (see Chart 2). The first consists of occupations intensive in cognitive skills. These include corporate management, professionals, support technicians and clerical staff. The second comprises employees requiring basically communicative skills, among whom are service and sales workers. The third group is those occupations requiring intensive use of manual skills, such as skilled agricultural, manufacturing, construction and mining workers, craft artists, machine tool operators, assemblers and unskilled workers. The comparison of skills required in each of these groups suggests that a worker in a group intensive in cognitive skills will be unlikely to pursue, without additional training, an activity requiring manual

6 This database was developed in the United States based on the quantification by diverse experts of skills required in each occupation at a three-digit level of disaggregation. To do this, experts visit different workplaces and ask workers about the importance of a skill in their job. There are 52 skills which go from visual perception to mathematical problem solving or the use of force. The database may be found at http://www.onetonline.org. Since in Spain there is no data on the skills used in each occupation, the US data have been used. In this connect, it has been assumed that the skills required in a given occupation do not differ across countries, an assumption which does not seem very crucial in light of the stability of these indices over time.

7 The 52 skills have been divided into nine groups of skills according to Peri and Sparber (2009); and the occupations, which in the original data follow the US classification, have been mapped to the ISCO-88 two-digit groups, as in Amuedo Dorantes and De la Rica (2011).

SKILL SIMILARITY OF OCCUPATIONS

CHART 2



SOURCES: O*NET, with pairings of Amuedo Dorantes and De la Rica (2011), and Banco de España.

skills, or vice versa. However, the professions intensive in communicative skills are more versatile, given that these are required in a wide range of work.

Table 4 shows the degree of mismatch between the unemployed and the employed, based on the abovementioned classification of occupations according to their intensiveness in manual, communicative or cognitive skills. The results tend to confirm the conclusions of the preceding section. The mismatch between the skills of the employed and unemployed is similar to that estimated in other countries such as Italy or the euro area as a whole, although it is greater than that estimated for the United Kingdom. In all countries, the distribution of

INTENSITY OF SKILL USE IN OCCUPATIONS

TABLE 3

%	Limb, hand, and finger dexterity	Body coordination and flexibility	Strength	General perception	Visual perception	Hearing perception	Oral skills	Writing skills	Cognitive and analytical skills	Vocal skills
Managers	46.2	52.2	55.0	80.7	63.5	65.7	99.4	95.0	92.2	99.6
Professionals	49.9	54.6	52.7	81.2	63.1	72.0	94.7	96.4	93.0	94.4
Technicians and associate professionals	58.7	58.0	56.2	81.9	68.1	74.9	91.1	88.2	87.5	90.1
Clerical support workers	53.2	53.9	52.2	79.0	57.8	68.6	91.7	84.6	81.6	91.2
Service and sales workers	63.1	73.9	75.5	80.7	67.0	75.8	88.7	73.8	76.9	89.1
Skilled agricultural, forestry and fishery workers	81.4	90.3	92.6	82.7	78.9	82.8	76.2	69.0	78.3	69.3
Craft and related trades workers	84.3	83.2	82.7	81.5	72.8	76.5	64.1	64.5	73.4	61.1
Plant and machine operators, and assemblers	87.9	81.2	80.6	86.6	82.0	89.7	69.4	68.4	73.4	67.6
Elementary occupations	77.9	86.8	89.4	79.7	77.2	79.2	67.2	59.6	68.4	65.2

SOURCES: O*NET, with occupation matches from Amuedo Dorantes and De la Rica (2011), and Banco de España.

DISTRIBUTION OF JOB SKILLS IN THE UNEMPLOYED AND THE EMPLOYED

TABLE 4

	Spain		Euro area		Germany		Italy		United Kingdom	
CNO-2011 occupations	Unemployed	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed	Employed
Cognitive skills	20.6	42.9	25.3	51.2	25.3	55.3	24.2	48.0	39.4	56.2
Communication skills	23.7	21.5	23.6	17.1	23.6	15.4	27.0	16.1	24.9	19.2
Manual skills	55.7	35.6	51.2	31.8	51.2	29.3	48.8	35.9	35.8	24.7
Similarity of current occupational structure to that of the unemployed (a)	88.4		85.9		81.9		88.8		94.6	

SOURCES: Eurostat and Banco de España.

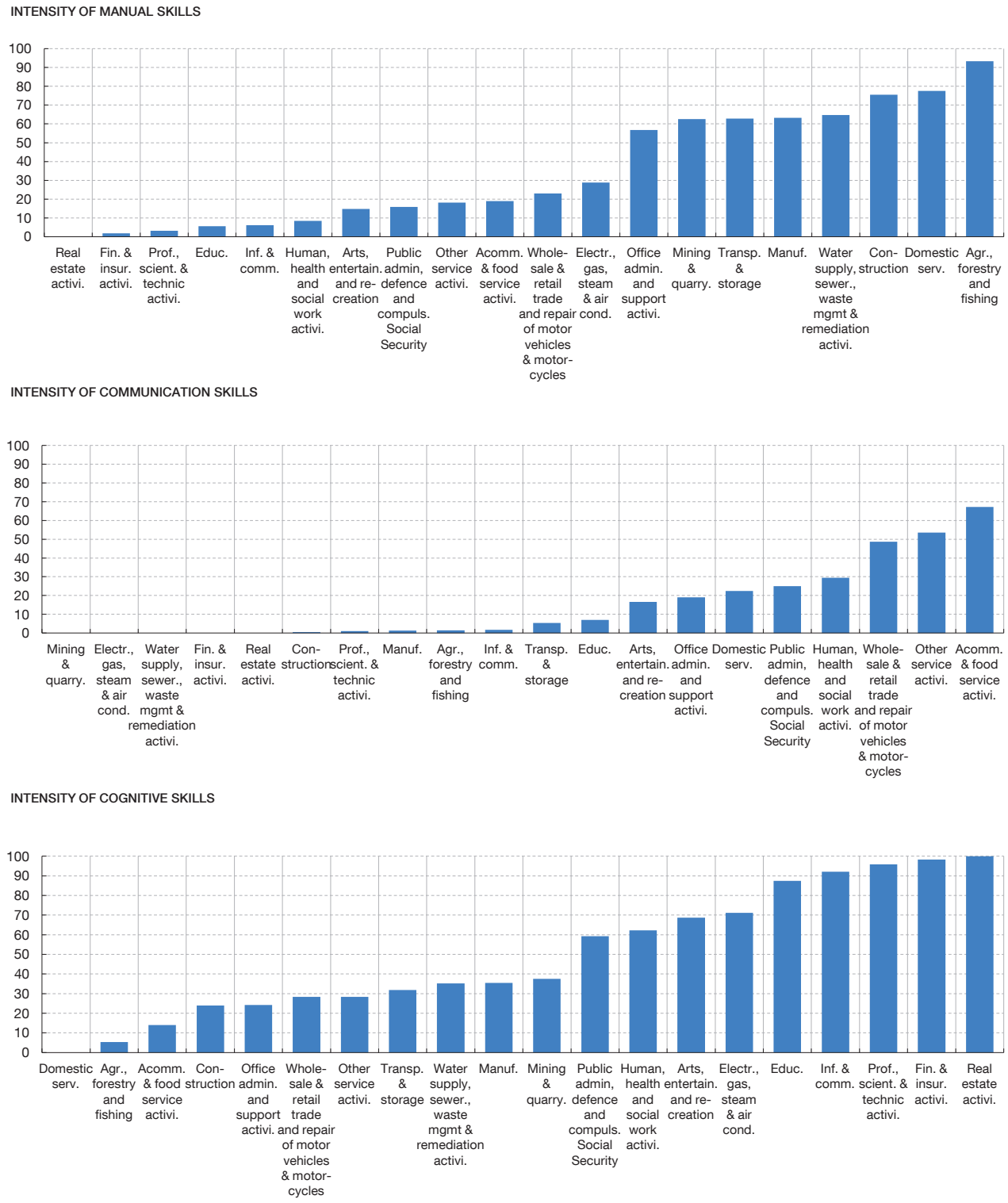
a Defined as $I = (\Sigma op \cdot oe)/(\Sigma op^2 \cdot \Sigma oe^2)^{1/2}$ where *op* and *oe* are two vectors which describe the percentage of unemployed and employed, respectively. in the aggregation of occupations according to their intensity in cognitive, communication and manual skills.

the unemployed population is skewed towards the less skilled workers who in their last job carried out work requiring manual skills. This percentage is higher in Spain than in other European countries, but at the same time the jobs requiring manual skills are also more numerous than in the rest of Europe. If the demand for this type of skills is stable over time, the productive specialisation of the Spanish economy will make it easier for the unemployed to find jobs.

To illustrate in which sectors the unemployed could find jobs, based on the skills exercised in their last job, Chart 3 shows the different skill requirements for each sector. It can be seen that, in addition to construction, the sectors in which unemployed persons with manual skills are potentially most likely to find jobs are agriculture, domestic service, industry and transport services. The sectors requiring communicative skills include most notably accommodation & food service activities and retail & wholesale trade. Finally, cognitive skills are used more intensively in real estate, financial and professional activities.

INTENSITY OF SKILL USE IN SECTORS

CHART 3



SOURCES: O*NET, with matches from Amuedo Dorantes and De la Rica (2011), and Banco de España.

INDEX OF SIMILARITY WITH VARIOUS SECTORAL EMPLOYMENT STRUCTURES TABLE 5

%	Spain
Job structure in Spain. 2011 Q4	87.5
Sectoral job vacancy structure in Spain. 2010 (a)	90.0
Sectoral structure of jobs created in the past year in Spain. 2011 Q4	91.1
Sectoral structure of the euro area and technology in Spain. 2011 Q4	82.6
Job structure of the euro area. 2011 Q4	79.2

SOURCES: Eurostat, Encuesta de la Población Activa (EPA), Encuesta de Coyuntura Laboral (ECL) and Banco de España.

a Job vacancies only reported for the market economy. Vacancies in the rest of the economy are assumed to be equal to jobs created in the past year in Spain according to the 2011 Q4 EPA (Spanish Labour Force Survey).

Occupational mismatch according to the sectoral pattern of employment growth

The aforementioned occupational mismatch problems will be exacerbated or lessened depending on which sectors generate employment in the future. Given the difficulty in predicting the future sectoral specialisation pattern, Table 5 calculates the degree of similarity of the unemployed and the employed under the different assumptions as to how the employment structure will vary in the coming years.[8] In the first row the sectoral structure at end-2011 is taken as reference. As shown above, the degree of similarity is fairly high, due to the high relative weight of the sectors which use most intensively the most common skills among the unemployed. Alternatively, a sectoral structure of employment could be assumed which reflects the sectoral distribution of job vacancies in 2010.[9] This sectoral structure will be overweight in accommodation & food service activities and underweight in manufacturing, so the unemployed/employed similarity index will improve relative to the current sectoral distribution. A similar result is obtained when the proxy used for a possible sectoral employment structure is the distribution of recently created jobs (those created less than one year ago).

Finally, counterfactual exercises were carried out to determine what would happen if Spain's sectoral structure were to converge with that of Europe. Thus the fourth row of Table 5 shows the degree of similarity of the unemployed and the employed when it is assumed that the sectoral distribution of employment in Spain becomes equal to the average in the euro area. Also, in the fifth row it is assumed that distribution of occupations in each sector also converges with the current one in the euro area. In these two cases the results show a considerable increase in the occupational mismatch, since euro area employment is skewed towards activities involving more intensive use of cognitive skills. Significantly, the similarity decreases even more if the European occupational distribution is applied, since in Spain the distribution of occupations within each sector is skewed towards occupations that are more intensive in manual and communicative skills.

Conclusions

This article seeks to assess the obstacles to future employability of the unemployed derived from possible mismatch between skills/occupations demanded by firms and those offered by the unemployed. The results obtained indicate that, despite the marked process of sectoral reallocation of employment derived from the crisis, the degree of similarity between the occupations of unemployed persons in their last job and those of the currently employed is high compared with other European countries. This result basically indicates

8 It is assumed that the distribution of occupations within a sector remains unchanged and only the relative weight of the sectors varies.

9 Using the data on job vacancies by sector in the 2010 *Encuesta de Coyuntura Laboral* (Labour Situation Survey).

that the high weight of lower-skilled occupations in the unemployed population is offset by the weight, also higher than in other countries, of those same skills among the employed. It should be noted, however, that if the future demand for labour tends towards a structure more skewed towards cognitive rather than manual skills, as in other European countries, the employability of the lower-skilled unemployed will decrease.

These results show the importance of active and passive labour market policies so that the unemployed can acquire or maintain the skills necessary to fill new job vacancies. To this end, government employment services would have to cooperate with private recruitment agencies in addressing firms' actual needs, and the occupational training system would have to be flexible enough to allow the required training when mismatches are detected between the job seekers' profile and the skills required.

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