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Who are the top 1% earners in Europe?

Oliver Denk

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By Oliver Denk

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ABSTRACT/RÉSUMÉ

Who are the top 1% earners in Europe?

Top earners have become the subject of intense public and scholarly debate. This is the first paper that comprehensively documents the profiles of the 1% highest paid employees across 18 European countries. The data come from the largest harmonised source available, an employer-based survey that covers the labour income of 10 million employees, excluding the self-employed. The patterns that emerge are broadly common across countries. Workers in the top 1% tend to be 40 to 60 years old, be men, have tertiary education, work in finance or manufacturing, and be senior managers. The analysis also uncovers several cross-country differences. For example, top earners are younger in Eastern Europe, and they include more women in countries with higher overall female employment. The new estimates in this paper are similar to related ones based on administrative records in the few countries for which such studies exist, indicating that the sample is broadly representative of the characteristics of top earners.

JEL classification: D31; D63; J21; J31.

Keywords: Income inequality, high earners, top 1%, bottom 99%, earnings distribution, Europe.

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Qui sont les 1 % des salariés les mieux payés en Europe ?

Les très hauts revenus sont aujourd'hui au cœur du débat public et des travaux universitaires. Ce document est le premier qui procède à une analyse complète du profil des 1 % des salariés les mieux payés dans 18 pays européens. Les données proviennent de la plus grande source harmonisée qui existe, une enquête auprès des employeurs qui porte sur le revenu du travail de 10 millions de salariés, hors travailleurs indépendants. Les caractéristiques mises en évidence sont globalement similaires d'un pays à l'autre. Les employés qui font partie des 1 % les mieux rémunérés se trouvent principalement parmi les personnes âgées de 40 à 60 ans, de sexe masculin, ayant fait des études supérieures, travaillant dans la finance ou l'industrie, et occupant un poste de haut dirigeant. L'analyse révèle également plusieurs différences entre pays. Par exemple, les employés à très hauts revenus sont plus jeunes en Europe de l'Est, et les femmes sont davantage représentées dans cette catégorie dans les pays où le taux d'emploi des femmes est plus élevé. Les nouvelles estimations que cette étude fournit recoupent celles basées sur des registres administratifs dans les quelques pays où de telles études existent, ce qui révèle que l'échantillon est globalement représentatif des caractéristiques des bénéficiaires de hauts revenus.

Classification JEL : D31 ; D63 ; J21 ; J31.

Mots-clés : Inégalités de revenu, bénéficiaires de hauts revenus, 1 % les plus riches, 99 % restants, distribution des revenus, Europe.

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WHO ARE THE TOP 1% EARNERS IN EUROPE?

Oliver Denk[1]

1. Top earners have increasingly come under the spotlight in both policy and scholarly circles over recent years, as evidence has mounted that their earnings are an important driver of high income inequality (Atkinson et al., 2011; OECD, 2011; Alvaredo et al., 2013; Förster et al., 2014). The issue of top earners has been particularly prominent in Anglo-Saxon countries, where their income share has risen the most. But it is also being hotly debated in Continental Europe which has seen more muted increases in the income share of top earners over past decades. This is, for example, reflected in the slogan "we are the 99%", i.e. the bottom 99% of the income distribution, coined by the Occupy movement. Originating from New York, Occupy protests subsequently spread to Germany, Spain, the United Kingdom and other European countries.

2. While the literature to date has been mainly concerned with the estimation of top income shares, knowledge on who these top earners actually are is scarce. Studies on top incomes often rely on tabulated statistics from administrative data on tax returns (beginning with Piketty, 2003; Piketty and Saez, 2003), not the individual observations themselves. Even when individual observations are available from income tax or social security data, they frequently contain little information on personal characteristics, such as education, occupation or industry of the worker. This problem is accentuated by tax units being defined by the family in many countries, whereas variables of interest often relate to one person. The drawback of most individual-level surveys is their much smaller sample size and insufficient coverage of top earners. The result is that few studies on the attributes of top earners exist and those that do focus on either a single country or a particular attribute.

3. This paper is the first study to fill these gaps by providing a comprehensive analysis of the profiles of the employees with the top 1% labour incomes across 18 European countries. It uses the Eurostat Structure of Earnings Survey (SES) from 2010. With a total of 10 million observations, the SES is the largest available dataset harmonising earnings across Europe. Employers report information to the SES. This has the advantage of ensuring high data accuracy and avoiding low response rates by top earners. The sample covers, however, only the population of employees, not self-employed. The focus is on labour income the data for which include salaries and bonuses and are not censored above a particular threshold. Labour income is the largest source of income heterogeneity and, as the observed characteristics analysed, related most closely with a single individual; capital income would have the difficulty of attributing it to any one person, especially in the context of joint savings by several household members.

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4. The SES provides labour income for 6% of the population of employees. To what extent are the characteristics of the top 1% in the sample representative of those of the top 1% in the population? Several papers relying on administrative records, in principle covering the universe of taxpayers, have documented selected features of the top 1% in a small subset of countries of this dataset. They can therefore be used for external benchmarking. Estimates in these studies are similar to the ones in this paper, for instance for France (Amar, 2010) and the United Kingdom (Brewer et al., 2007). This indicates that the SES sample is broadly representative of the characteristics of the employees with the 1% highest labour incomes. Moreover, these related studies usually also cover the self-employed and include capital income in the definition of income rank. Hence, a further implication of the similarity of the findings is that the absence of the self-employed and of capital income from the dataset in this paper is unlikely to have a systematic influence on the analysis.

5. The main contribution of this paper is to present descriptive statistics on the socio-demographic and job characteristics of the top 1% earners and contrast them with the characteristics of the bottom 99% earners. Personal attributes it focuses on are the employee's age, gender and highest attained level of education. In addition, evidence is provided on the number of years the employee has been with her firm, industry and occupation. The appendices to the paper contain extensive sets of cross-country comparative data and individual country profiles. The descriptive statistics focus on the distribution of characteristics among the top earners and compare it with the rest of the population. The paper then employs regression analysis to determine the characteristics that, conditional on the characteristic, make it more likely for an employee to be a top earner, irrespective of the absolute frequency of characteristics in the population. For example, workers aged above 60 are not many among the top 1% and the bottom 99%, even if much more common among the top 1%. The regressions, however, show that workers above 60 are unusually often represented in the top 1%, as conditional on being above 60 their probability of being in the top 1% is higher than for other ages.

6. Several patterns emerge that are common across countries. The top 1% tend to: be in the 40s and 50s; be men; have a tertiary education degree; work in finance, manufacturing, or wholesale and retail; and be employed as chief executives or in other senior management positions. 70% among the top 1% are between 40 and 59 years old, while workers in this age group make up half of all other employees. 80-85% among the top 1% are men versus 50-55% among the bottom 99%. The share of men among the top 1% exceeds 90% in two countries: Germany and Luxembourg. 80-85% among the top 1% completed tertiary education, compared with 30-35% among the bottom 99%. Half of the top 1% are employed in finance, manufacturing, or wholesale and retail. 15% of them are chief executives or senior officials and another 45% corporate managers.

7. Besides these patterns which are broadly similar across Europe, the analysis uncovers important differences between countries.

8. First, top earners are disproportionately younger, often in their 30s, in Eastern European countries (the Czech Republic, Estonia, Hungary, Poland and the Slovak Republic). The much younger age of top earners in Eastern Europe is likely related to the economic transformation of these countries after the fall of the Iron Curtain. Workers already in the labour market during the 1980s, the latter years of communism in Eastern Europe, have a smaller chance than in Western Europe of having moved up to the top 25 years later. The analysis shows that the differences in the age composition of top earners between Eastern and Western Europe are not explained by a generally younger workforce in Eastern Europe.

9. Second, in countries with higher overall female employment more of the top 1% are women. The paper makes no attempt to establish causality from higher female employment to more women at the top. Nevertheless, one way to interpret this finding is that general measures to broaden female participation in the labour market might have the benefit of facilitating high-paying careers for women.

10. Third, the information and communication industry is unusual in that in countries with a high share of the bottom 99% working in this industry the share of the top 1% working in information and communication is low. While this result, too, is obtained from a simple cross-country correlation, it is consistent with the hypothesis that such technologies are complementary with high-skilled tasks in other industries.

11. Fourth, health professionals are a large group of top earners in several countries. Life expectancy has a positive correlation with the share of the top 1% who are health professionals. The correlation suggests the possibility of life expectancy gains from high-paid, high-skilled health professionals. The analysis shows that the same statistical relationship does not hold for the share of the bottom 99% who are health professionals.

12. Fifth, the top 1% have on average stayed three years longer with their current firm than other workers. Many of the top 1% are either new recruits or have had a career with their employer for more than 20 years. New recruits are less frequent among the top 1% in Southern European countries (Greece, Italy, Portugal and Spain). This could be a sign of lower labour market flexibility at the top in these economies.

13. The paper proceeds with regressions to determine the characteristics which significantly raise the probability of earning a top 1% labour income, conditional on the characteristic. People who are older, who are male, with a tertiary education degree, who work in the financial, the professional services or the information and communication industries, and who are employed as chief executives or in other senior management positions are the most likely to be in the top 1%, given their profile. By contrast, firm-specific skills (when captured by the length of firm tenure) as opposed to general skills influence the likelihood of being a top earner little, when other observable characteristics are controlled for.

14. A small literature on the profiles of high earners has emerged, but the few studies available to date examine either a single country or a single characteristic of interest. For the United States, different authors have analysed the composition of top-income households by their age (Auten et al., 2013), gender (Guvenen et al., 2014), industry (Kaplan and Rauh, 2010) and occupation (Bakija et al., 2012). Brewer et al. (2007) provide a comprehensive account of the characteristics of high earners in the United Kingdom. Several papers have conducted similar investigations for other countries; among them are Fortin et al. (2012) and Statistics Canada (2013) for Canada, Amar (2010) and Godechot (2012) for France, and Budría and Díaz-Giménez (2007) for Spain. Atkinson et al. (2015) describe the gender composition of top incomes in five countries applying individual income taxation: Australia, Denmark, Norway, Spain and the United Kingdom. The 2002 wave of the SES was used by Simón (2010) and Du Caju et al. (2010) to study the determinants of wage inequality and the size of inter-industry wage differentials in up to 9 European countries, but they did not focus on top earners. Denk (2015) used the same data source as in this paper to analyse pay levels, in particular of high earners, in the financial industry.

15. The remainder of the paper is organised as follows. The next section describes the data. Section 2 presents the average statistics across Europe and benchmarks them with what is known, if anything, from tax records and other data sources. Section 3 documents several systematic differences between countries. Section 4 proceeds with the regression analysis. The last section concludes. Appendix A1 provides cross-country comparisons and Appendix A2 individual country profiles.

1. The data

16. The data analysis uses the Eurostat Structure of Earnings Survey (SES) from 2010. The SES has individual-level data on the characteristics of employees, including earnings, their employers and jobs in 18 countries of the European Economic Area: 17 from the European Union and Norway. The data for Germany are from the 2006 edition of the SES, the most recent version available. The SES covers a

repeated cross-section of employees and was conducted in 2002 (for a smaller set of countries), 2006 and 2010. Results for this paper are qualitatively and quantitatively similar for 2006, before the global financial crisis, and 2010, during the global financial crisis. The nature of the findings presented, which are based on the 2010 wave, is thus not predicated on the state of the economy and the labour market at the time of the crisis.

17. The SES is an employers' survey. The information reported is therefore likely to be more reliable than that from household surveys.[2] The data are obtained from a sample of employees drawn from a stratified sample of local units of enterprises, or the enterprises themselves where the enterprise has no decentralised activities. The coverage of enterprises with at least 10 employees is mandatory, that of enterprises with fewer than 10 employees optional. The sampling procedure contains usually two stages. In the first stage, a stratified random sample of local units is drawn. Stratification criteria may include the industry, the number of employees in the enterprise which the local unit belongs to and the region. For the second stage, a simple random sample of employees is usually taken within each of the selected local units. Some countries use only a one-stage sample and cover all employees within the reporting local units.

18. The income variable this paper uses is gross annual labour earnings, or annual labour earnings before tax deductions and social security contributions payable by the employee. Besides salaries, the data comprise "any periodic, irregular, ad-hoc and exceptional bonuses and other payments that do not feature every pay period" (European Commission, 2010). This is of particular importance for high-income employees, especially in certain industries such as finance. The labour income of employees who have worked for less than one year for their current employer is adjusted to an annual basis, so that the sample consists of full-year equivalent employees.[3] In the statistics presented, observations from the same country are weighted to make the sample better aligned with the actual population. The survey data systematically cover all industries, with the exception of "public administration, defense and compulsory social security" in Belgium, Germany, Italy, Luxembourg, Norway and Portugal.

19. The incomplete coverage of enterprises with fewer than 10 employees and of employees in the public administration should not be an important constraint on the analytical findings, as very few of them are likely to be top 1% earners. For example, excluding workers in the public administration for all countries does not materially affect any of the results. Nevertheless, the SES also has potential drawbacks which must be kept in mind when interpreting the results. The most important caveat is the absence of self-employed persons from the sample. For example, Brewer et al. (2007) find that the top 1% in the United Kingdom receive more of their income, about 22%, from self-employment than the average taxpayer. A final consideration is the frequently used practice of "top-coding", which censors data by reporting a smaller value for incomes above a threshold to ensure anonymity. The SES data are not top-coded.[4]

2. For example, the Eurostat household survey European Union Statistics on Income and Living Conditions (EU SILC) is available annually, while the SES is conducted every four years. However, besides the higher reliability of information, the SES also has the advantage of a significantly larger sample size. The higher frequency of the EU SILC allows timely tracking of overall income inequality (OECD, 2015), even if top incomes are not well covered (Ruiz and Woloszko, 2015).

3. The paper follows Eurostat practice (European Commission, 2010) and adjusts the earnings of employees working for less than one year but more than 30 weeks to their full-year equivalent. This effectively assumes that these employees earned the same labour income with their previous employer and were not outside employment between the two jobs. Employees working for less than 30 weeks are excluded from the analysis.

4. The exception is Germany for which labour income is top-coded when it exceeds EUR 1 million. However, the bottom 99%-top 1% labour income cut-off is well below this level, so that top-coding for Germany has no limitations for the main parts of the analysis.

20. The total number of observations for the 18 countries in the sample is 10.2 million (Table 1). They represent 6% of all employees in the sampled countries when the OECD Economic Outlook database is used. The sample size varies considerably across countries; it exceeds 1 million in the Czech Republic, Germany and Norway and is less than 50 000 in Greece and Luxembourg. The survey covers more than 20% of the population of employees in the Czech Republic, Estonia, Hungary, Norway and the Slovak Republic. Using the sample weights to calculate the top 1% and the bottom 99% shows that the 1% highest earners in the survey are sampled in an approximately representative manner; they make up 0.95% of all observations.

Table 1. Sample size

	Top 1%	Bottom 99%	Share of total employees, per cent
Belgium	1 351	125 615	3.4
Czech Republic	22 470	1 651 426	39.4
Estonia	1 913	105 330	21.2
Finland	3 201	286 400	13.2
France	3 199	201 211	0.8
Germany	18 471	3 032 045	8.3
Greece	416	36 068	1.2
Hungary	4 039	831 168	23.4
Italy	3 039	250 184	1.4
Luxembourg	178	17 106	5.1
Netherlands	1 766	156 015	2.1
Norway	13 900	1 398 690	58.1
Poland	6 332	638 079	5.4
Portugal	1 279	108 107	2.6
Slovak Republic	6 707	676 914	37.8
Spain	4 655	194 713	1.2
Sweden	2 592	257 848	6.1
United Kingdom	1 457	165 514	0.7
European Union*	96 965	10 132 433	6.0

Note: The table provides the breakdown of the sample by country. The second column gives the number of observations for the top 1% in the survey, the third column the number of observations for the bottom 99% in the survey and the last column the share of all employees in the country covered in the survey. Categorisation into top 1% and bottom 99% is calculated using sample weights, which is why the number of observations for the top 1% is not exactly 1% of the total number of observations. European Union* lists the aggregate statistics for the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey; OECD Economic Outlook database.

2. Descriptive statistics

21. This section first measures labour income shares of the top 1% and then presents descriptive statistics by age, gender, education, length of firm tenure, industry and occupation. It ends with a quantitative comparison of the results with those in the literature in the few cases where papers previously studied similar issues for selected countries.

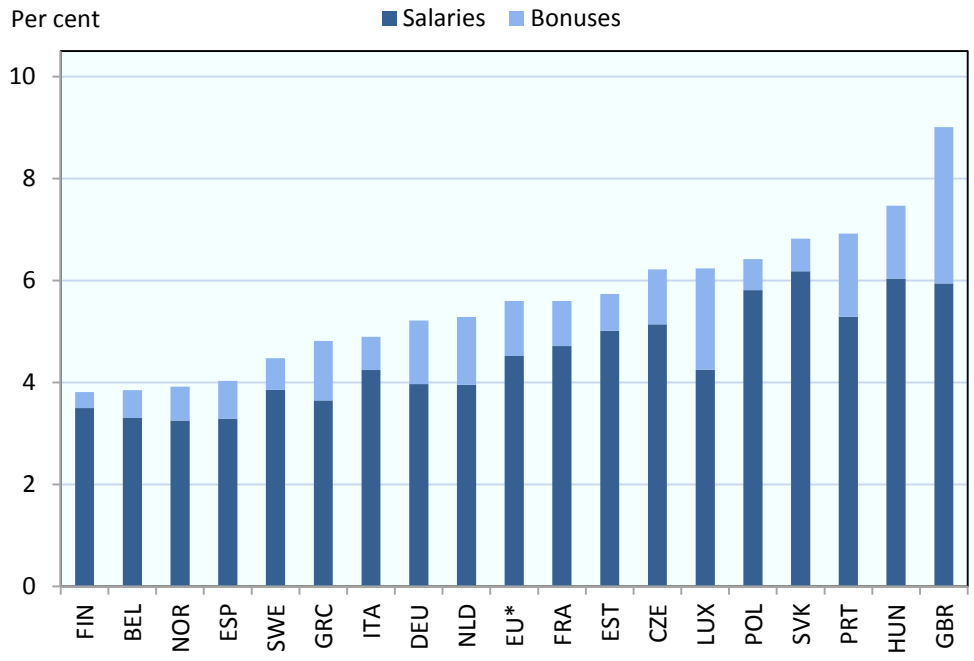
2.1. Labour income inequality at the very top

22. The labour income share of the top 1% earning employees is 5-6% on average across European countries (Panel A of Figure 1). It is largest in the United Kingdom, and tends to be high in Eastern Europe (Hungary, the Slovak Republic, Poland) and low in Northern Europe (Finland, Norway, Sweden). EU* is the unweighted average across countries. Portugal is another country where the income share of the top 1% is high, while at the other end countries in Northern Europe are joined by Belgium and Spain. Bonuses make up one-fifth of the labour income of top earners on average and are a particularly common method of pay in the United Kingdom and Luxembourg. Top income inequality is correlated with broader indicators of inequality. Countries with higher overall earnings inequality, as measured by the Gini coefficient for labour income, have higher earnings inequality at the top, as measured by the labour income share of the top 1% (Panel B of Figure 1).

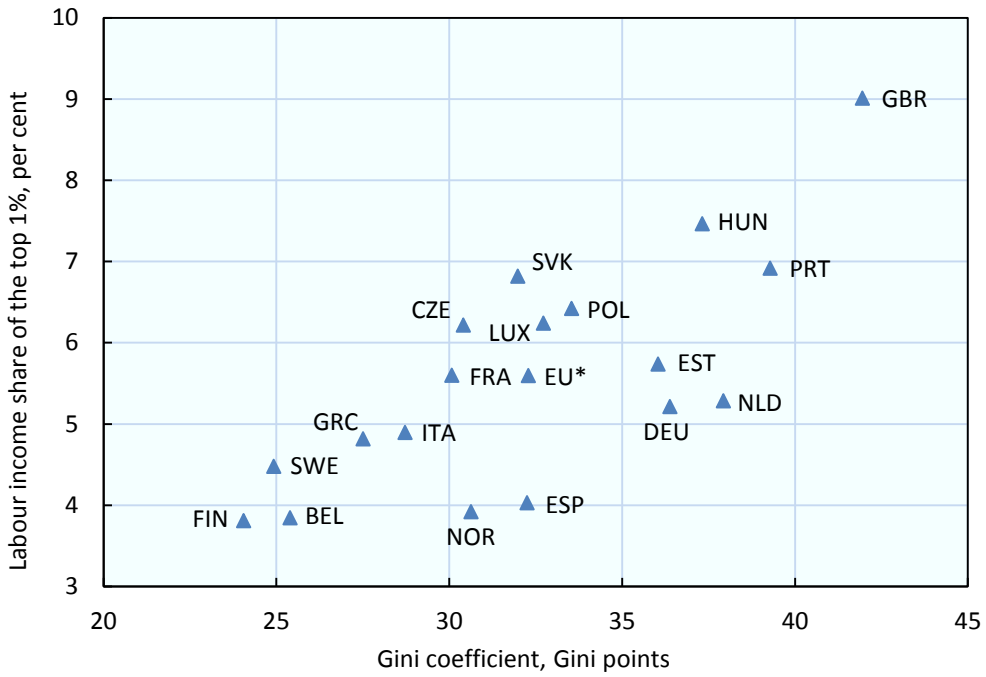
23. These shares for top incomes are smaller than in related work (Alvaredo et al., 2015), which uses tax return data on total income of the entire population, not labour income of employees. Differences are likely related to this paper's exclusion of capital income, non-employed and self-employed and incomplete coverage of enterprises with fewer than 10 employees and employees in the public administration. Capital income is more concentrated than labour income and expanding coverage to the non-employed raises the bottom 99%-top 1% cut-off, so that both channels reduce the top income shares in this paper. Alvaredo et al. (2015) report data for ten countries around the year 2010 according to which, consistent with the present findings, the income share of the top 1% is much greater in the United Kingdom than in other countries. Subsection 2.3 shows that despite the smaller size of top income shares in this paper the characteristics of top earners are similar to those in other papers where such studies exist. Characterising the profiles of the top 1% earners requires less income precision than the correct calculation of top income shares, since what matters is whether a person belongs to the top 1%, not what her exact income is.

Figure 1. Labour income inequality at the very top

A. Labour income of the top 1% divided by aggregate labour income



B. Labour income inequality overall and at the top

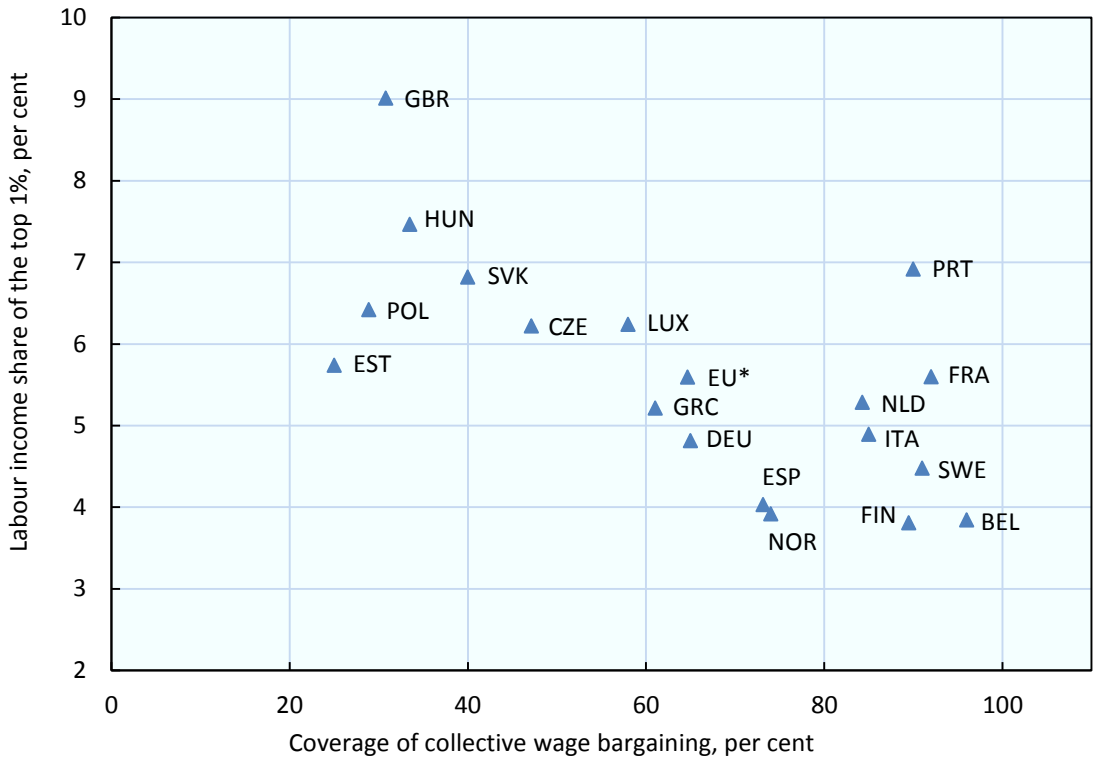


Note: The figure shows the heterogeneity in top labour income shares across countries and the cross-country correlation between overall labour income inequality and labour income inequality at the top. EU* is the unweighted average across the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey.

24. The cross-country variation in the labour income share of the top 1% is related with indicators of labour market institutions. Top earners obtain a smaller share of the economy's aggregate labour income in countries where more workers are covered by collective wage bargaining (Figure 2). The indicator for collective wage bargaining is taken from the database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS). The relationship is statistically significant at the 1% level, even though a few countries show a somewhat different pattern.[5] One way to interpret this cross-country bivariate correlation is that collective wage bargaining systems may support "middle-class" workers in receiving a larger share of the wage pie. This argument concentrates on the influence of the non-executive side of worker bargaining on top income inequality, unlike Piketty et al. (2014) who study the executive side. It is in line with evidence in Jaumotte and Osorio Buitron (2015) who analyse the relationship between the total income share of the top 10% and union density with a particular focus on capital income.

Figure 2. Collective wage bargaining and the labour income share of the top 1%



Note: The figure shows a negative, statistically significant at the 1% level, cross-country correlation between the coverage of collective wage bargaining and the labour income share of the top 1%. EU* is the unweighted average across the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey; ICTWSS.

25. Looking at the profiles of the 1% highest paid employees shows that nearly all work full-time and have a permanent contract in each of the 18 countries. A slim majority of top earners is employed in firms that have more than 250 employees. The proportion of employees who work in these large firms is greater among the top 1% than the bottom 99%, except in Northern European countries (Finland, Norway and

5. Regressing the labour income share of the top 1% on the coverage of collective wage bargaining yields a coefficient estimate of -0.038 and a p-value of 0.003. The R-squared is 0.438 and the number of observations 18.

Sweden). The remainder of the section studies in detail how other characteristics are related with the position in the earnings distribution.

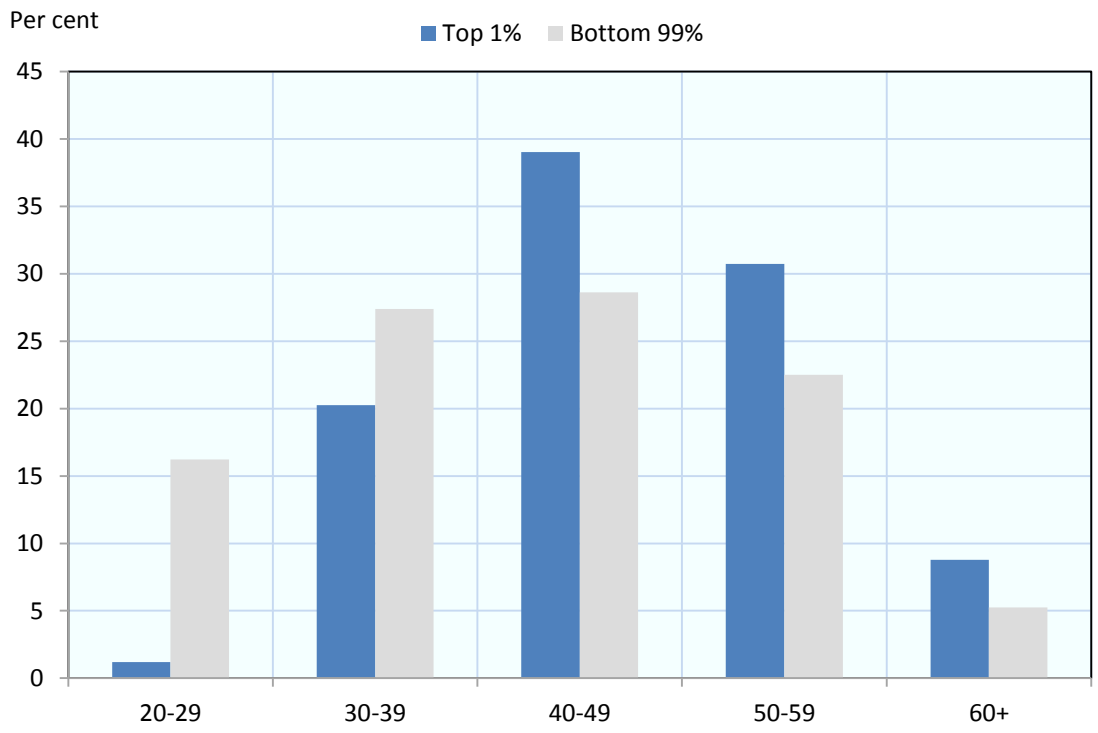
2.2. Average composition of the top 1% earners

26. The descriptive statistics below depict the unweighted average across the 18 European countries in the sample.

Age

27. The top 1% tend to be in the 40s and 50s (Figure 3; Figure A1.1 in Appendix A1; Panels A in Appendix A2).[6] Overall, 9 out of 10 top 1% earners are between 30 and 59 years old.

Figure 3. Average share of age groups



Note: The figure shows that employees in the top 1% are often in their 40s and 50s, whereas employees who are less than 40 years old are a relatively large group of the bottom 99%.

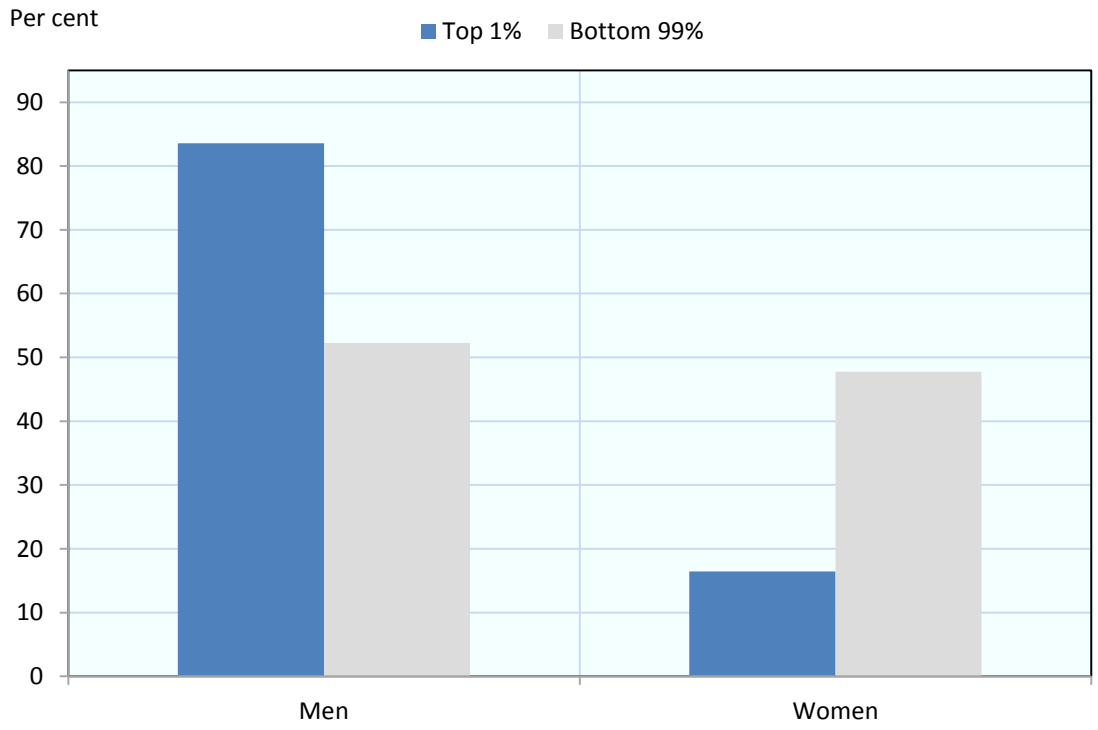
Source: Author calculations using Eurostat Structure of Earnings Survey.

6. A few hundred observations of people aged between 10 and 19 years have been removed from the sample.

Gender

28. Most of the top earners are men and disproportionately so: 80-85% among the top 1% are men versus 50-55% among the bottom 99% (Figure 4; Figure A1.2 in Appendix A1; Panels B in Appendix A2). The share of men among the top 1% exceeds 75% in all countries and 90% in two: Germany and Luxembourg. Women are represented less among high-earning individuals relative to the European average in some countries which introduced, or are in the process of introducing, regulatory quotas for female directors on corporate boards, including Belgium, France, Germany and Norway.

Figure 4. Average share of men and women



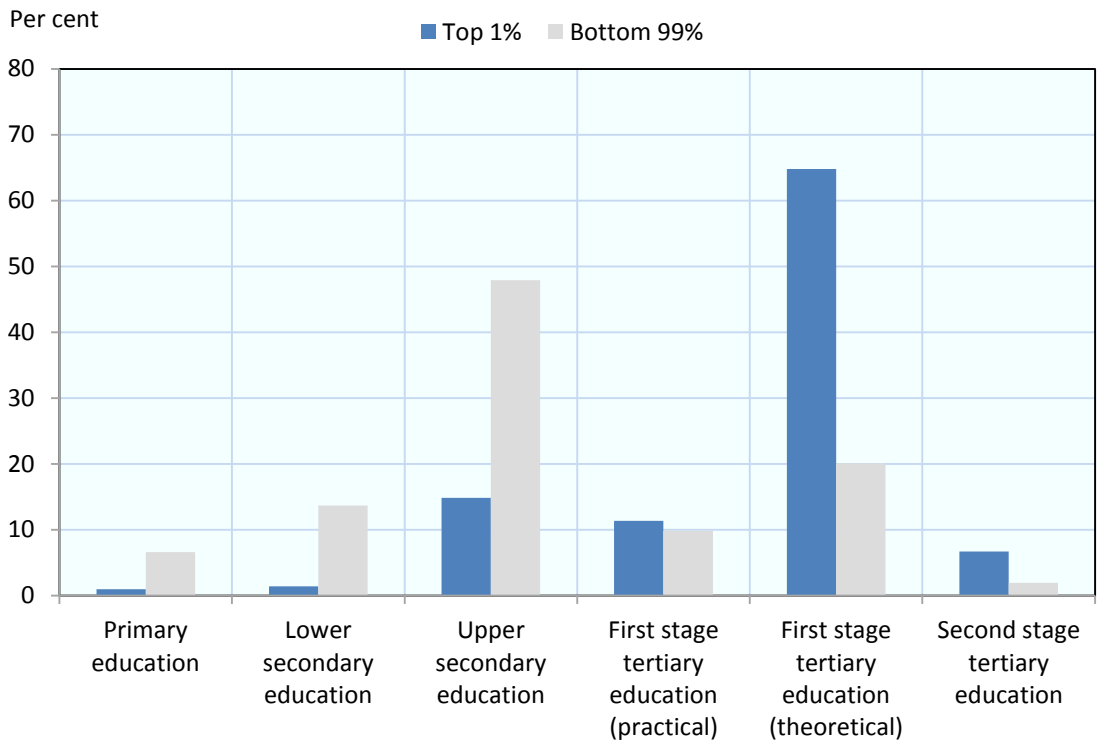
Note: The figure shows that employees in the top 1% are very often men, whereas employees as a whole are about half men and half women.

Source: Author calculations using Eurostat Structure of Earnings Survey.

Education

29. A higher educational attainment strongly raises the likelihood of earning a top 1% labour income (Figure 5; Figure A1.3 in Appendix A1; Panels C in Appendix A2). Among the top 1% 80-85% completed tertiary education, compared with 30-35% for the bottom 99%. Top 1% earners with only primary education or lower secondary education are rare. This pattern is very similar across countries.

Figure 5. Average share of highest education degree



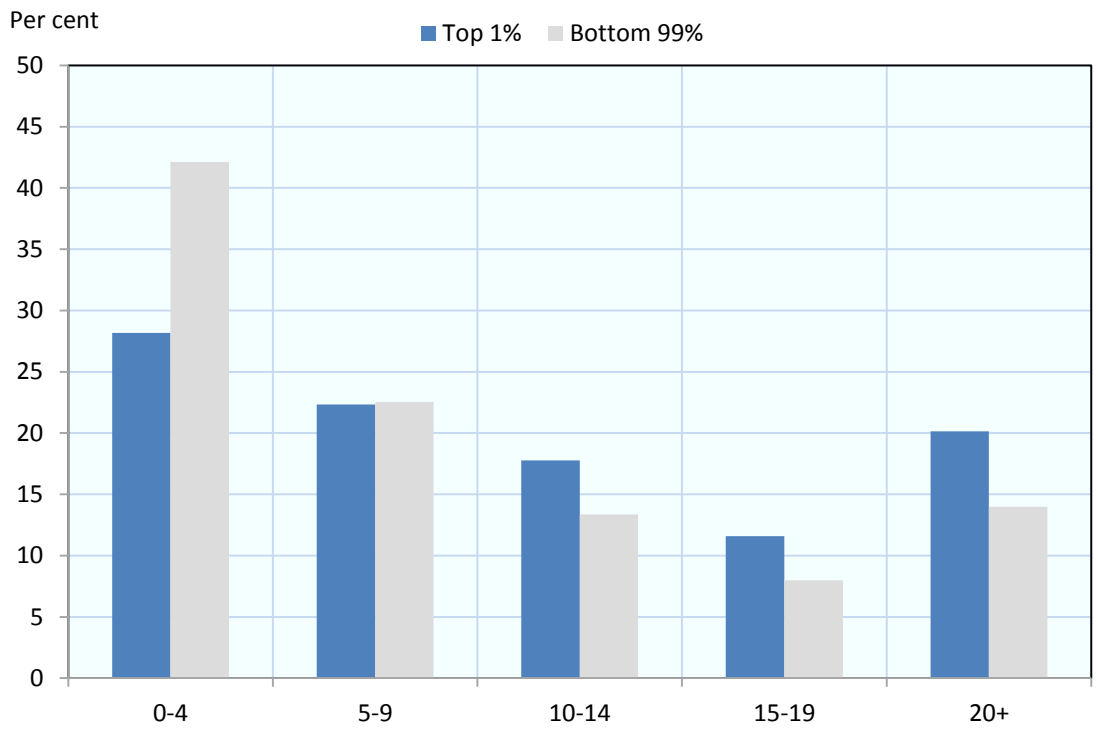
Note: The figure shows that most employees in the top 1% have a tertiary education degree, whereas the majority of employees in the bottom 99% have at most a secondary education degree.

Source: Author calculations using Eurostat Structure of Earnings Survey.

Length of firm tenure

30. The top 1% have on average stayed three years longer with their current firm than other workers (Figure 6; Figure A1.4 in Appendix A1; Panels D in Appendix A2). The top 1% tend to be either relatively new recruits or have stayed with their employer for more than 20 years.

Figure 6. Average share of years of firm tenure ranges



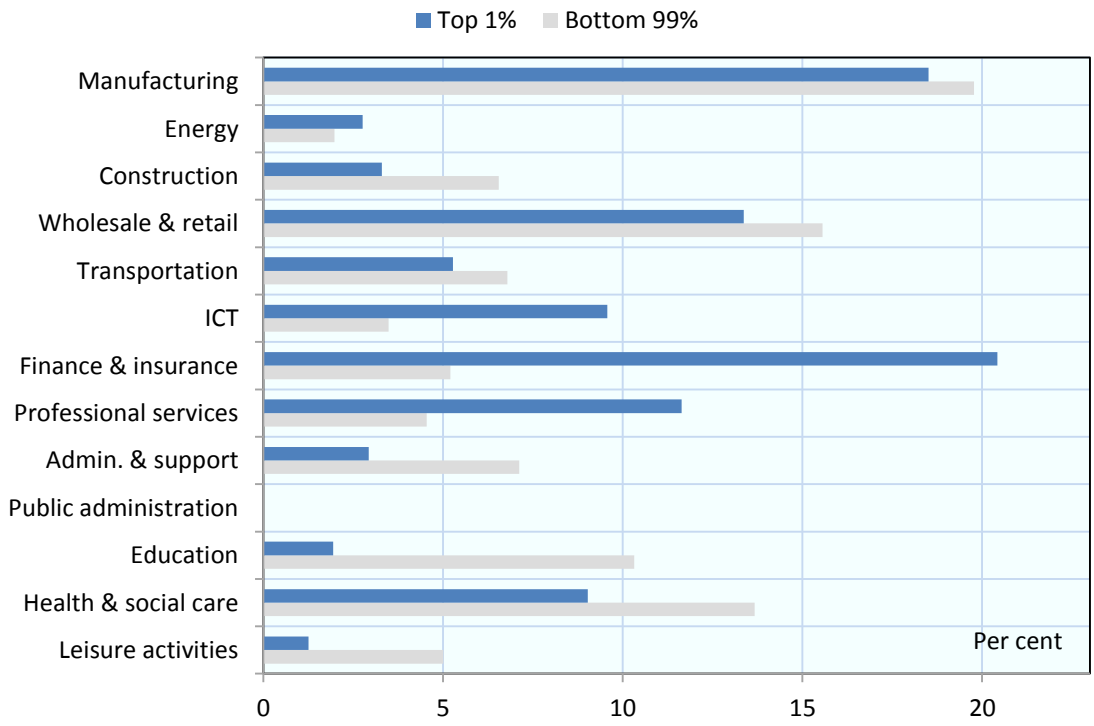
Note: The figure shows the distribution of the top 1% and the bottom 99% by the number of years a person has worked for her current employer.

Source: Author calculations using Eurostat Structure of Earnings Survey.

Industry

31. Industries are available based on NACE Rev. 2. The three industries in which most of the top 1% work are finance and insurance, manufacturing, and wholesale and retail trade (Figure 7; Figure A1.5 in Appendix A1; Panels E in Appendix A2).[7] When compared with the bottom 99%, top earners are much more represented in the finance and insurance, professional services, and information and communication (ICT) industries. The fraction of workers in finance and insurance increases from 20% in the top 1% to 27% in the top 0.1%.

Figure 7. Average share of industries



Note: The figure shows the distribution of the top 1% and the bottom 99% by industry. Some 1-digit industry codes in NACE Rev. 2 have been pooled to ensure readability (see footnote to the main text). Employees in the public administration are not available for all countries and are therefore removed from the sample for cross-country comparison. Germany is excluded from the average since its industry classification is defined according to NACE Rev. 1.1.

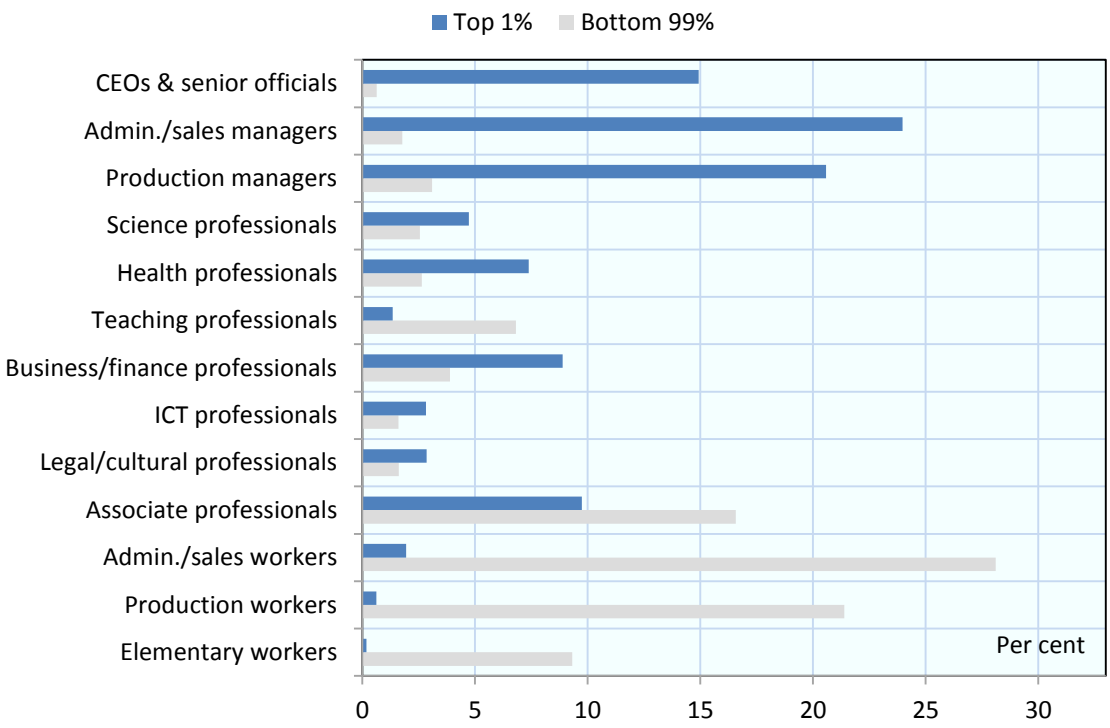
Source: Author calculations using Eurostat Structure of Earnings Survey.

7. In these statistics: Manufacturing includes mining and quarrying; energy is waste management and the supply of electricity, gas, steam and water; finance and insurance includes real estate activities; administrative and support services includes other service activities; and leisure activities is accommodation, food services activities, arts, entertainment and recreation.

Occupation

32. Occupations are available based on ISCO-08. Top executives and business and finance professionals receive much attention in the public debate, but their proportion among the top 1% is only about a quarter (Figure 8; Figure A1.6 in Appendix A1; Panels F in Appendix A2).[8] Non-executive managers make up 45%. The share of the top 0.1% who are top executives or business and finance professionals is almost 40% and therefore higher than the equivalent share for the top 1%.

Figure 8. Average share of occupations



Note: The figure shows the distribution of the top 1% and the bottom 99% by occupation. Several 2-digit occupation codes in ISCO-08 have been pooled to ensure readability (see footnote to the main text). Germany is excluded from the average since its occupation classification is defined according to ISCO-88.

Source: Author calculations using Eurostat Structure of Earnings Survey.

2.3. Comparison with existing results

33. To what extent are the characteristics of the top 1% in the sample representative of those of the top 1% in the population? Several papers using administrative records, in principle covering the universe of taxpayers, have documented selected features of the top 1% in a small subset of countries. They can therefore be used for external benchmarking, although contrary to this paper they often include the self-employed and capital income. The main insight of this subsection is that the present estimates are close to previous ones in the few cases where such estimates are available. The similarity of results in this and other

8. In these statistics: Administrative/sales workers is clerical support workers and service and sales workers; production workers is plant and machine operators and assemblers, craft and related trades workers, and skilled agricultural, forestry and fishery workers; and elementary workers is elementary occupations and armed forces occupations.

papers indicates that the SES sample is broadly representative of the characteristics of the employees with the 1% highest labour incomes. Furthermore, it also suggests that external validity of the phenomena described in this paper goes beyond the specific focus on the labour income of employees, given the more comprehensive income definition and population coverage in these papers.

34. Several studies quantify the number of women among top earners for individual countries. Atkinson et al. (2015) use tax returns to describe the gender distribution of top earners in three countries that are also in this paper: Norway, Spain and the United Kingdom. Even though their data are based on all taxpayers (including the self-employed) and total income (including capital income), the results in this paper are similar to theirs. Atkinson et al. (2015) find that the proportion of women among the top 1% is about 9% in Norway, 23% in Spain and 17% in the United Kingdom, compared with 11% for Norway, 24% for Spain and 13% for the United Kingdom in this paper. Similarly, Brewer et al. (2007) estimate that in 2005 approximately 15% of the top 1% in the United Kingdom were women. According to Amar (2010), in 2007 13% among the top 1% earners in France's private sector were women, only a tad less than the 14% this paper finds. Outside Europe, Guvenen et al. (2014) and Fortin et al. (2012) show that women make up 18% in the United States and 17% in Canada among the top 1%.

35. With respect to age, according to Brewer et al. (2007) in 2005 about 65% of the top 1% in the United Kingdom were between 35 and 54 years old, the same number the analysis in this paper yields for 30-49-year-olds. For France, Amar (2010) estimates that in 2007 72% among the 1% highest earners were in the 40s and 50s, which is nearly identical to the 71% in this paper. Of the top 1%, approximately 50% are 35-54-year-olds in the United States (Auten et al., 2013) and 80% 35-64-year-olds in Canada (Fortin et al., 2012).

36. Fewer systematic results are available for industry and occupation. Denk (2015) relies on the same data source as the one in this paper to estimate the proportion of top earners working in finance and insurance. Kaplan and Rauh (2010) document that many top earners in the United States work in finance, consistent with the evidence for Europe in Denk (2015) and this paper. For France, this paper finds that 20% of the top 1% earning employees work in finance and insurance, compared with 18% for 2007 in Amar (2010). In Ireland, which the present sample does not cover, 31% of the 1% highest earning tax units are in finance and insurance (Kennedy et al., 2015), a similar order of magnitude as the 35% in this paper for the United Kingdom. Bakija et al. (2012) use a different classification system to determine high-income occupations in the United States. Similarly to the results in this paper, they document the importance of executives, managers and financial professionals.

3. Cross-country differences in the composition of top earners

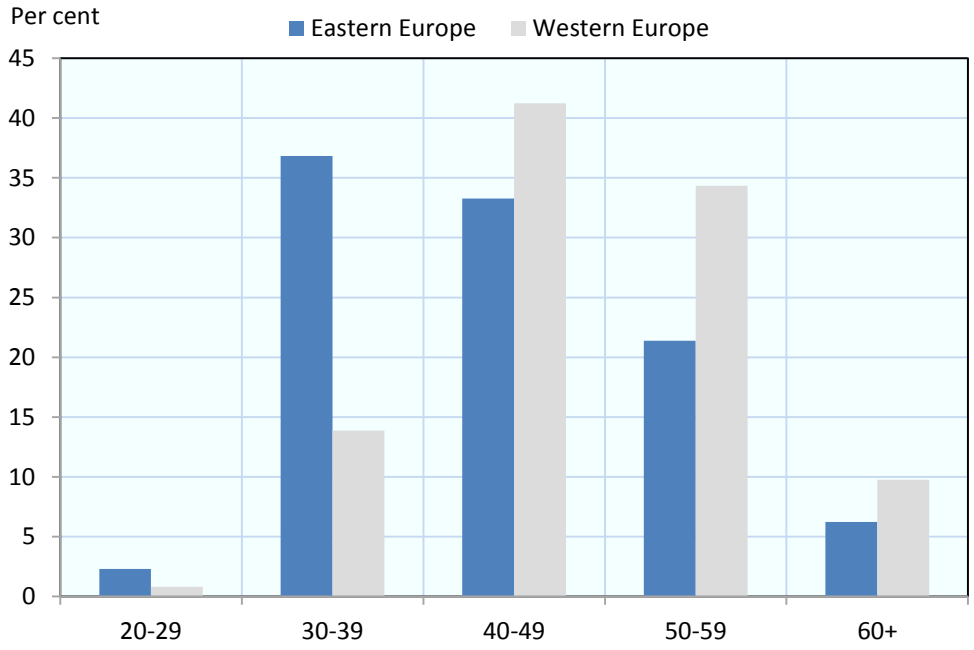
37. This section sheds light on several cross-country differences in the composition of top earners.

3.1. Age in Eastern and Western Europe

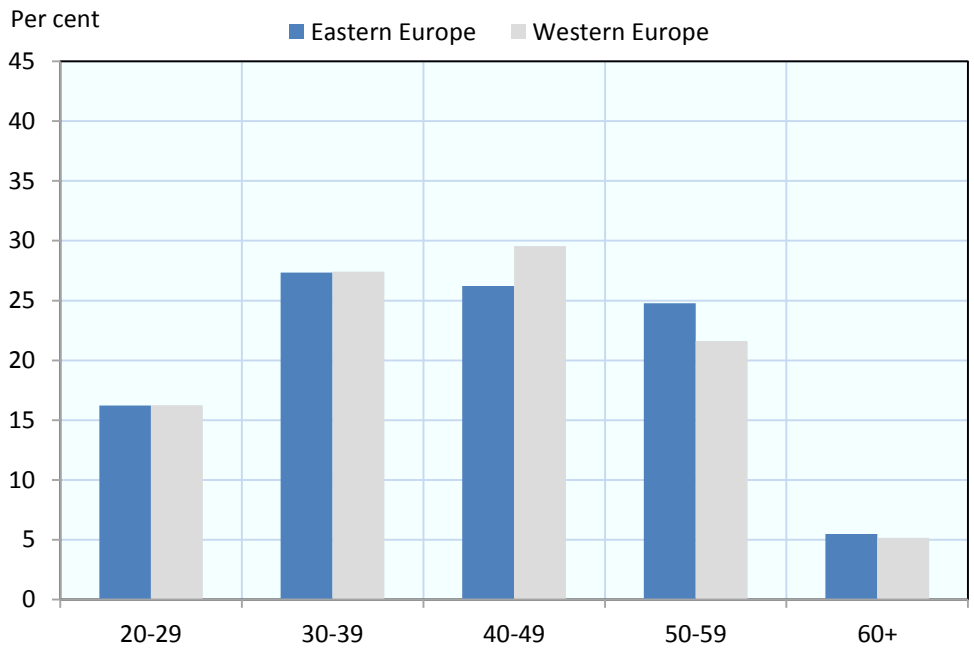
38. Comparing Eastern European countries (the Czech Republic, Estonia, Hungary, Poland and the Slovak Republic) with Western European countries shows that the top 1% are disproportionately younger, often in their 30s, in Eastern Europe (Panel A of Figure 9). This is even though the age structure as a whole does not differ between these two groups of countries (Panel B of Figure 9). The much younger age of top earners in Eastern Europe is likely related to the economic transformation of these countries after the fall of the Iron Curtain. Workers already in the labour market during the 1980s, the latter years of communism in Eastern Europe, have a smaller chance than in Western Europe of having moved up to the top 25 years later.

Figure 9. Employees' age in Eastern and Western Europe

A. Average share of age groups among the top 1%



B. Average share of age groups among the bottom 99%



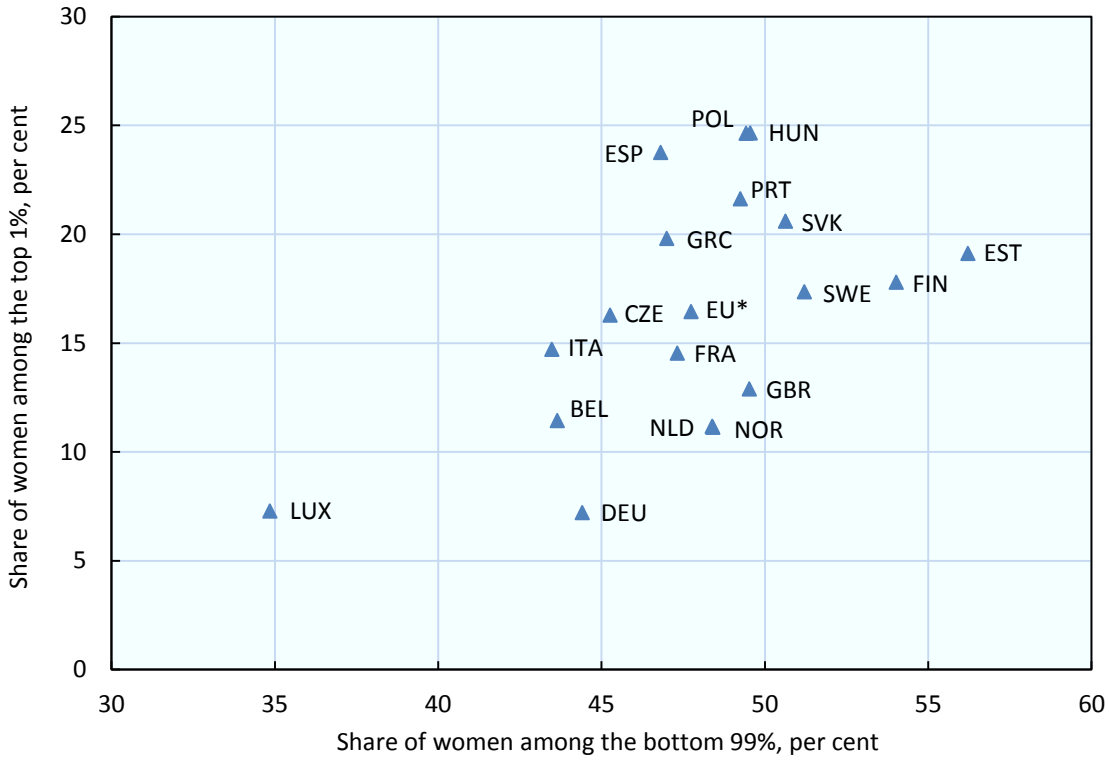
Note: The figure shows that top 1% earners tend to be much younger in Eastern than Western Europe, even though employees are not generally younger in Eastern than Western Europe. Eastern Europe includes the Czech Republic, Estonia, Hungary, Poland and the Slovak Republic. The statistics are the unweighted average across the countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey.

3.2. Women among the bottom 99% and the top 1%

39. In countries with more female employment among the bottom 99% earners the share of women among the top 1% is higher, statistically significant at the 5% level (Figure 10).[9] The share of women among the bottom 99% is virtually identical to the overall female employment share which includes the top 1%. One way to interpret this positive cross-country correlation between the female employment share and the fraction of women at the top is that general measures raising female labour force participation may feed through to the higher ranks of the corporate hierarchy. This feedthrough is, however, incomplete. According to the empirical results, if the fraction of women among the bottom 99% increases by three percentage points, the fraction of women among the top 1% rises by two percentage points.

Figure 10. Women among the bottom 99% and the top 1%



Note: The figure shows a positive, statistically significant at the 5% level, cross-country correlation between the share of women among the bottom 99% and the share of women among the top 1%. EU* is the unweighted average across the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey.

40. The established relationship is nearly unchanged when Eastern European countries are removed from the sample and so appears to be quite general. The combination of higher female employment overall and reduced gender gaps at the top is an interesting counterpart to Olivetti and Petrongolo (2008). They find that more female employees increase average gender wage gaps, as this pulls more women with below-average skills into employment. The two results together suggest that higher female employment could have two opposing effects on man-woman-comparisons. It may widen gender wage gaps but promote female representation at the top.

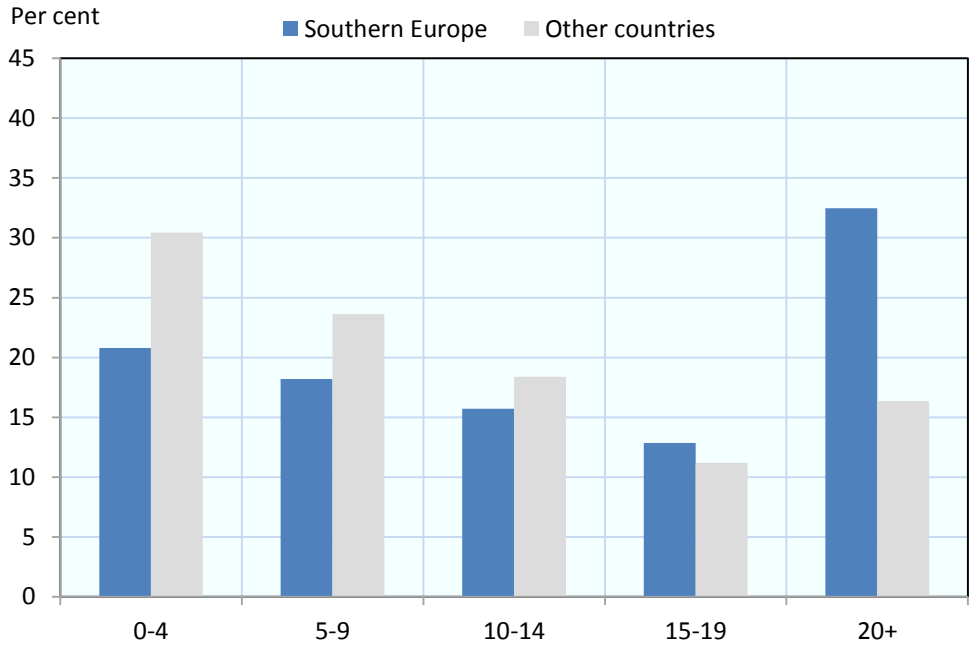
9. Regressing the share of women among the top 1% on the share of women among the bottom 99% yields a coefficient estimate of 0.655 and a p-value of 0.019. The R-squared is 0.298 and the number of observations 18.

3.3. Length of firm tenure in Southern Europe and other countries

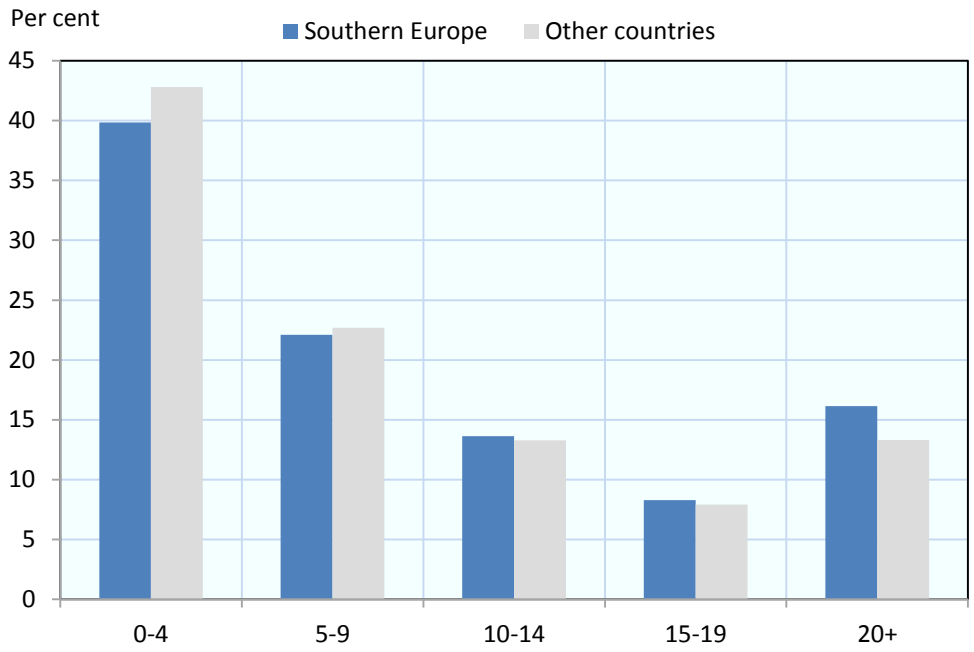
41. In Southern European countries (Greece, Italy, Portugal and Spain), one-third of the top 1% have worked for the same firm for more than 20 years, more than in the other European countries (Panel A of Figure 11). This is despite the similarities in firm tenure between Southern Europe and other countries for the bottom 99% (Panel B of Figure 11). These cross-country differences in firm tenure for high earners could be a sign of weaker labour market flexibility at the top in Southern European countries.

Figure 11. Employees' length of firm tenure in Southern Europe and other countries

A. Average share of years of firm tenure ranges among the top 1%



B. Average share of years of firm tenure ranges among the bottom 99%



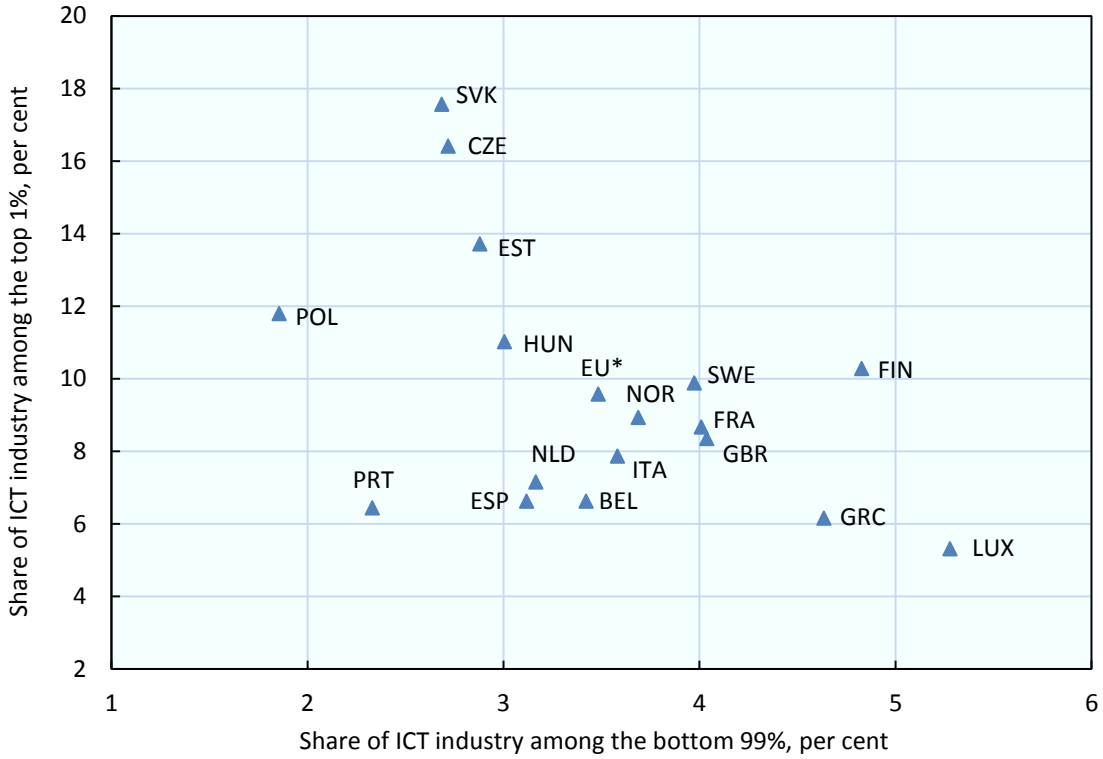
Note: The figure shows that top 1% earners tend to have been employed with their current firm for much longer in Southern Europe than other countries, even though years of firm tenure are not generally different in Southern Europe than elsewhere. Southern Europe includes Greece, Italy, Portugal and Spain. The statistics are the unweighted average across the countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey.

3.4. Employees in the ICT industry among the bottom 99% and the top 1%

42. Information and communication is the only industry for which the share of employees among the top 1% falls with the share of employees among the bottom 99% in a statistically significant fashion (Figure 12).[10] Related studies have argued that information and communication technologies (ICT) are complementary with non-routine tasks performed by high-skilled workers in other industries (Autor et al., 2003; Michaels et al., 2014). If more ICT helps create high-value jobs elsewhere, a larger share of employees working in ICT may squeeze out ICT employees from the top of the earnings distribution. The negative correlation across countries in the figure is consistent with this view. Eastern European countries, where relatively many of the top 1% but few of the bottom 99% work in ICT, are critical for identifying the relationship.

Figure 12. Employees in the ICT industry among the bottom 99% and the top 1%



Note: The figure shows a negative, statistically significant at the 5% level, cross-country correlation between the share of employees among the bottom 99% working in the ICT industry and the share of employees among the top 1% working in the ICT industry. Employees in the public administration are not available for all countries and are therefore removed from the sample for cross-country comparison. Germany is not included since its industry classification is defined according to NACE Rev. 1.1, not NACE Rev. 2 as for the other countries. EU* is the unweighted average across the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey.

10. Regressing the share of ICT employees among the top 1% on the share of ICT employees among the bottom 99% yields a coefficient estimate of -1.955 and a p-value of 0.030. The R-squared is 0.277 and the number of observations 17.

3.5. Health professionals and life expectancy

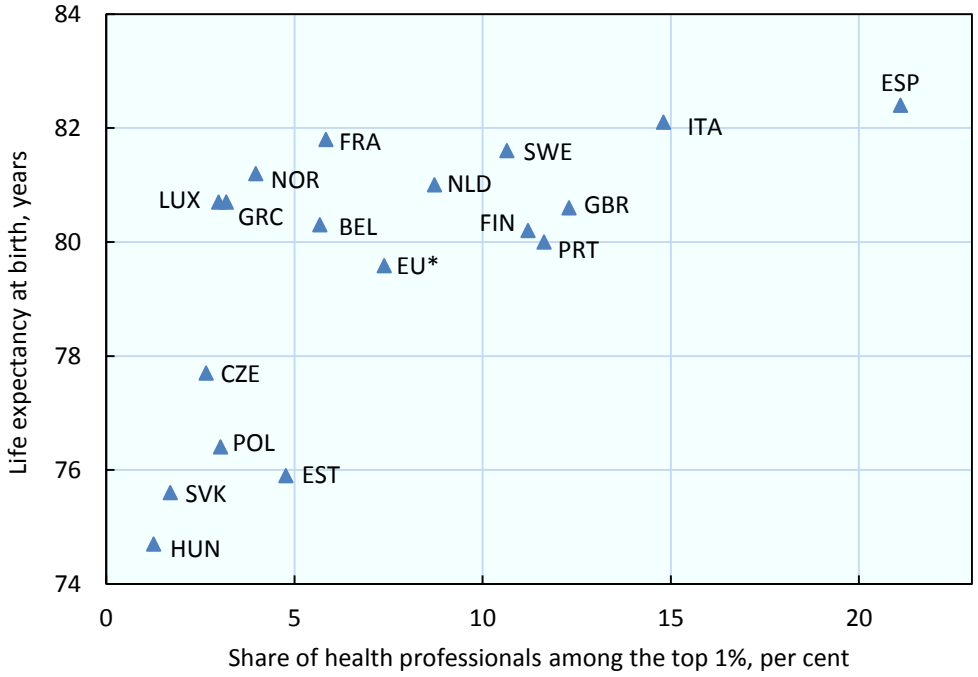
43. Health professionals are another large group of top-income earners and exceed the number of business and finance professionals among the top 1% in Finland, France, Italy, Portugal, Sweden and the United Kingdom. The proportion of health professionals among the top 1% is positively correlated with life expectancy at birth (Panel A of Figure 13). A one percentage point increase in the share of health professionals among the top 1% is associated with a 3½ months longer life, statistically significant at the 1% level.[11] The same relationship does not hold for the proportion of health professionals among the bottom 99% (Panel B of Figure 13). The values for life expectancy are taken from the OECD Health Statistics database.

44. Countries in Eastern Europe are an important driver of the underlying statistical relationship, and excluding them reduces the slope coefficient and raises the p-value for the share of the top 1% who are health professionals to slightly above 10%, although the number of observations is now only 12. Another consideration is that in several countries many doctors are self-employed and hence missing from the data, although it is not clear how this would impact the present finding which highlights differences between the top 1% and the bottom 99%. As with the other cross-country comparisons in this paper, the relationship does not establish causality from one health variable to the other. Nevertheless, the correlation suggests the possibility of life expectancy gains from being treated by high-paid, high-skilled health professionals.

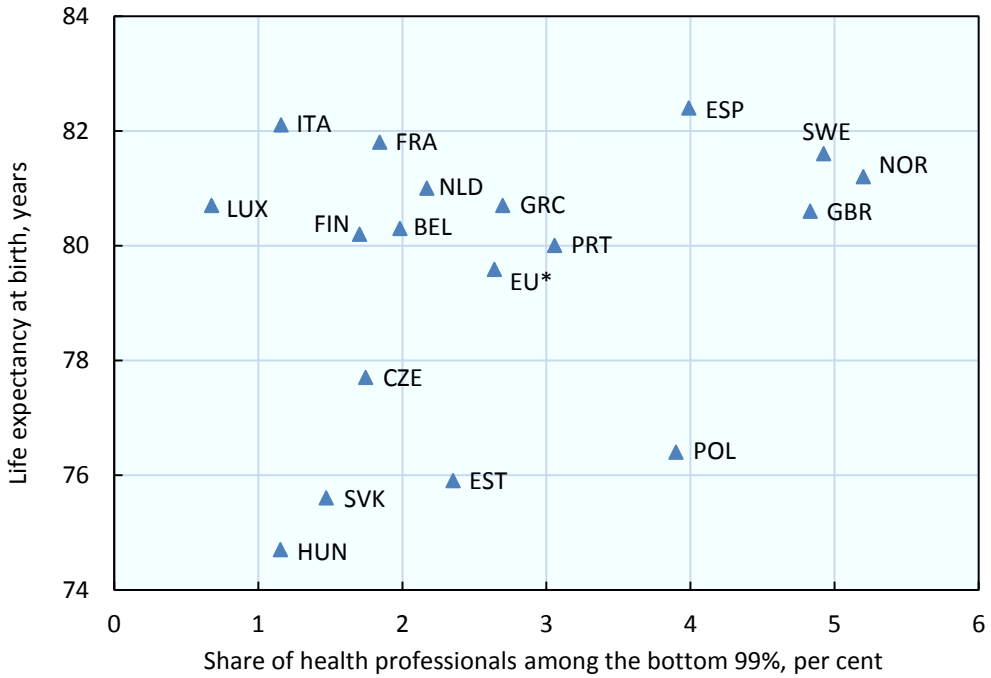
11. Regressing life expectancy at birth on the share of health professionals among the top 1% yields a coefficient estimate of 0.289 and a p-value of 0.006. The R-squared is 0.407 and the number of observations 17.

Figure 13. Health professionals and life expectancy

A. Health professionals among the top 1%



B. Health professionals among the bottom 99%



Note: The figure shows a positive, statistically significant at the 1% level, cross-country correlation between the share of health professionals among the top 1% and life expectancy. The same relationship does not hold for the bottom 99%. Germany is not included since its occupation classification is defined according to ISCO-88, not ISCO-08 as for the other countries. EU* is the unweighted average across the European countries in the sample.

Source: Author calculations using Eurostat Structure of Earnings Survey; OECD Health Statistics database.

4. Regression analysis

45. The previous section documented the unconditional distribution of the top 1% earners by socio-demographic and job characteristics. It also showed the unconditional distribution of all other earners by the same characteristics. However, the analysis so far made no explicit link in the estimation between the relative frequency of top earners and all others among individuals with the same characteristic, such as age, gender or industry. The objective of this section is to study how unusual it is that a person is a top 1% earner, conditional on him having a particular characteristic, for example being 40-49 years old, being a man or working in finance. Standard regression design is used.

46. An indicator variable taking on unity when the worker is in the top 1% is regressed on all the observable characteristics of the previous section (Table 2). The regression relies on a linear probability model; results are very similar for logit and probit specifications. The standard errors are clustered by country; heteroskedasticity-robust standard errors (not clustered by country) are somewhat smaller than those reported here. For each characteristic the category in the middle, when measuring the proportion among the top 1% earners, is chosen as the reference. Observations are weighted to make the sample better aligned with the actual population.

47. Several features of the data merit consideration. First, information for employees in the public administration is not available for all countries. They are retained in the sample, but results are very similar when these observations are removed for all countries. Second, the regression includes a country dummy for Germany and industry and occupation are coded as 0 for Germany, since their classification is defined somewhat differently. The results are again very similar when Germany is removed from the dataset. Finally, the specification does not have dummy variables for the other countries, which has no discernible influence, in particular as the dependent variable (being in the top 1%) has the same frequency for all countries.

48. The regressions identify as the main determinants for the probability of a top 1% labour income: being older; being male; having a more advanced education degree; working in finance and insurance, information and communication, or the professional services; and being employed as a chief executive or in another managerial position. The probability to be a top 1% earner is about: 1 percentage point higher for people aged 40 years and more relative to 30-39-year-olds, 1¼ percentage points higher for men relative to women, and 2 percentage points higher for holders of a theoretical tertiary education degree relative to others.

49. Conditional and unconditional probabilities of being in the top 1% are in many cases similar, but some differences stand out. The conditional probabilities rise monotonically in age and education, contrary to the unconditional probabilities, reflecting the increasingly higher likelihood of being in the top 1% given a higher age or degree. Being a chief executive or senior official is by a large margin the best predictor of earning a top 1% labour income, even though this group makes up only 15% of the top 1%, much less than some groups defined by age, gender or other characteristics. Firm-specific (captured by the length of firm tenure) as opposed to general skills influence the likelihood of being a top earner in a hump-shaped form. The likelihood is lowest for new recruits and employees who have had a long career with their current firm. However, the economic significance of the estimates is small when other observable characteristics are controlled for.

Table 2. The determinants of the probability of a top 1% labour income

Dependent variable: Indicator for the top 1%	Coefficient estimate	Standard error
Age in years: reference 30-39		
20-29	-0.204*	0.100
40-49	0.815***	0.083
50-59	0.923***	0.145
60+	1.146**	0.454
Gender: reference Woman		
Man	1.268***	0.080
Education: reference Upper secondary		
Primary	-0.008	0.087
Lower secondary	-0.067	0.086
First tertiary (practice)	0.563	0.414
First tertiary (theory)	1.745**	0.611
Second tertiary	2.654**	0.958
Years of firm tenure: reference 10-14		
0-4	-0.219***	0.043
5-9	-0.129**	0.054
15-19	-0.094*	0.054
20+	-0.215*	0.123
Industry: reference Transport		
Manufacturing	0.359***	0.066
Energy	0.190	0.212
Construction	-0.155	0.107
Wholesale & retail	0.118	0.075
Information & communication	0.948**	0.333
Finance & insurance	2.603***	0.729
Professional services	0.844***	0.205
Admin. & Support	-0.220	0.159
Public administration	-1.080***	0.249
Education	-0.921***	0.319
Health & social care	-0.117	0.126
Leisure activities	-0.301**	0.112
Occupation: reference Science professionals		
CEOs & senior officials	17.659***	2.067
Admin./sales managers	8.431***	1.276
Production managers	3.696***	1.043
Health professionals	2.352***	0.408
Teaching professionals	-0.106	0.276
Business/finance professionals	0.872***	0.149
ICT professionals	-0.473	0.365
Legal/cultural professionals	0.778**	0.340
Associate professionals	0.015	0.292
Admin./sales workers	0.167	0.337
Production workers	-0.510	0.358
Elementary workers	0.184	0.398
R-squared	0.060	
Observations	9 984 921	

Note: The regression is OLS. It shows the change in the probability that a person is a top 1% earner when she falls in this instead of the reference category. Standard errors are clustered at the country level. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. Observations are weighted to make the sample better aligned with the actual population. A country dummy for Germany is included and industry and occupation are coded as 0 for observations from Germany, since their classification is defined somewhat differently.

Source: Author calculations using Eurostat Structure of Earnings Survey.

50. The regression coefficients are average estimates across the 18 European countries in the sample. To gauge the degree to which countries are heterogeneous in the determinants for the probability of a top 1% labour income, two regressions are run: one for Western and the other for Eastern European countries (Table 3). Three differences are particularly noteworthy. First, in Eastern Europe employees who are 40 to 49 years old are the most likely to be in the top 1%, while in Western Europe this is the case for employees who are 60 years or older. This pattern is in line with the descriptive finding in Subsection 3.1 that top earners are younger in Eastern compared with Western Europe. Second, the gender gap at the top, or the extent to which the gender of the individual explains top 1% labour earnings, is somewhat less pronounced in Eastern Europe. Third, among industries finance and insurance maximises the likelihood of being in the top 1% in Western Europe, information and communication in Eastern Europe. This result resonates well with Subsection 3.4 which showed that in Eastern European countries relatively many of the top 1% but few of the bottom 99% work in information and communication.

Table 3. The determinants of the probability of a top 1% labour income: Western and Eastern Europe

Dependent variable: Indicator for the top 1%	Western Europe		Eastern Europe	
	Coefficient estimate	Standard error	Coefficient estimate	Standard error
Age in years: reference 30-39				
20-29	-0.124	0.110	-0.714***	0.061
40-49	0.901***	0.084	0.357**	0.085
50-59	1.090***	0.143	0.004	0.087
60+	1.301**	0.518	0.039	0.237
Gender: reference Woman				
Man	1.305***	0.090	0.968***	0.022
Education: reference Upper secondary				
Primary	-0.029	0.115	0.023	0.035
Lower secondary	-0.101	0.083	0.246***	0.027
First tertiary (practice)	0.536	0.456	0.754**	0.214
First tertiary (theory)	1.634**	0.675	2.511***	0.233
Second tertiary	2.468**	1.022	4.066***	0.352
Years of firm tenure: reference 10-14				
0-4	-0.207***	0.048	-0.298***	0.063
5-9	-0.099	0.064	-0.260*	0.110
15-19	-0.082	0.063	-0.185	0.104
20+	-0.207	0.137	-0.366*	0.138
Industry: reference Transport				
Manufacturing	0.395***	0.078	0.115**	0.033
Energy	0.271	0.233	-0.042	0.288
Construction	-0.070	0.110	-0.505**	0.121
Wholesale & retail	0.125	0.093	0.045	0.113
Information & communication	0.653*	0.345	3.305**	0.728
Finance & insurance	2.719***	0.844	1.836***	0.280
Professional services	0.842***	0.238	0.913	0.518
Admin. & Support	-0.169	0.178	-0.433**	0.154
Public administration	-1.020***	0.268	-1.599***	0.213
Education	-0.859**	0.362	-1.353***	0.249
Health & social care	-0.075	0.141	-0.398*	0.150
Leisure activities	-0.227*	0.120	-0.710***	0.104
Occupation: reference Science professionals				
CEOs & senior officials	19.368***	2.423	15.670**	4.302
Admin./sales managers	8.385***	1.472	8.654**	1.976
Production managers	3.569**	1.204	4.358**	0.972
Health professionals	2.568***	0.409	1.007**	0.290
Teaching professionals	-0.160	0.336	0.066	0.081
Business/finance professionals	0.761***	0.180	1.420***	0.202
ICT professionals	-0.697*	0.385	1.239	0.635
Legal/cultural professionals	0.738*	0.398	0.936	0.468
Associate professionals	-0.112	0.332	0.779***	0.071
Admin./sales workers	0.045	0.374	0.937***	0.089
Production workers	-0.663	0.385	0.462**	0.115
Elementary workers	0.011	0.430	1.294***	0.181
R-squared	0.057		0.089	
Observations	6 054 216		3 930 705	

Note: The regressions are OLS. They show the change in the probability that a person is a top 1% earner when she falls in this instead of the reference category. Standard errors are clustered at the country level. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level. Observations are weighted to make the sample better aligned with the actual population. In the regression for Western Europe, a country dummy for Germany is included and industry and occupation are coded as 0 for observations from Germany, since their classification is defined somewhat differently.

Source: Author calculations using Eurostat Structure of Earnings Survey.

5. Conclusion

51. This paper is the first to undertake a full characterisation of the top 1% earners in 18 European countries. It uses the largest harmonised dataset available, an employer-based survey with a sample of 10 million employees. This survey overcomes main weaknesses associated with alternative data sources which have been more widely used for income inequality analysis to date. Tax records tend to have insufficient information on the profiles of individual earners, and household surveys usually have a small sample size. In addition, the inclusion of a large set of European countries allows analysing differences in the characteristics of top earners between countries, an important issue that practically no paper has attempted.

52. Common patterns are found across countries. The top 1% tend to: be in the 40s and 50s; be men; have a tertiary education degree; work in finance, manufacturing, or wholesale and retail; and be employed as chief executives or in other senior management positions. These results are broadly in line with the few ones that are already known in the literature, either for a particular country or for a particular characteristic. The consistency of results has two important implications; it suggests, first, that the characteristics of the top 1% in the survey are representative and, second, that the exclusion of the self-employed and of capital income may not affect the findings. Some of the results might not come as a surprise. Yet, this is the first time that the composition of top earners has been rigorously quantified with one consistent dataset and such a large number of countries along several important dimensions.

53. The paper proceeded with regressions to identify the categories of characteristics for which the fraction of top earners is particularly high. These are individuals who: are 40 years or older; are male; have a more advanced tertiary education degree; work in finance and insurance; and are employed as chief executives or in other senior management positions. Besides these broadly similar patterns across Europe, the study has uncovered several important cross-country differences. For example, top earners are younger in Eastern Europe, they include more women in countries with higher overall female employment, and they have worked with their current employer for longer in Southern Europe.

54. The analysis opens the scope for further research along several directions. One of these could be to explore causality in some of the simple cross-country correlations the paper documents. Another avenue that could be pursued is to combine the data on the top 1% in this paper with sector-specific measures of regulation. This would allow empirical testing of the market-based view (Kaplan and Rauh, 2013) versus the rent-extraction view (Bivens and Mishel, 2013) to explain high labour incomes at the top. The hypothesis of the rent-extraction view would be that sectors which are more strongly regulated relative to other sectors and other countries attract more top 1% incomes. Finally, the paper has treated European countries as individual economies. An extension could also look at the characteristics of the top earners in Europe as a whole.

APPENDIX A1. CROSS-COUNTRY COMPARISONS

55. This appendix contains cross-country comparisons on the characteristics of the top 1% earners and the bottom 99% earners. The source underlying the figures is author calculations using the Eurostat Structure of Earnings Survey. EU* is the unweighted average of the sample countries. Employees in the public administration are not available for all countries and are therefore removed from the sample underlying Figure A1.5. The data define industry and occupation classifications somewhat differently for Germany, which does not allow matching the categories for the other countries in Figures A1.5 and A1.6.

Figure A1.1. Share of 40-49-year-olds

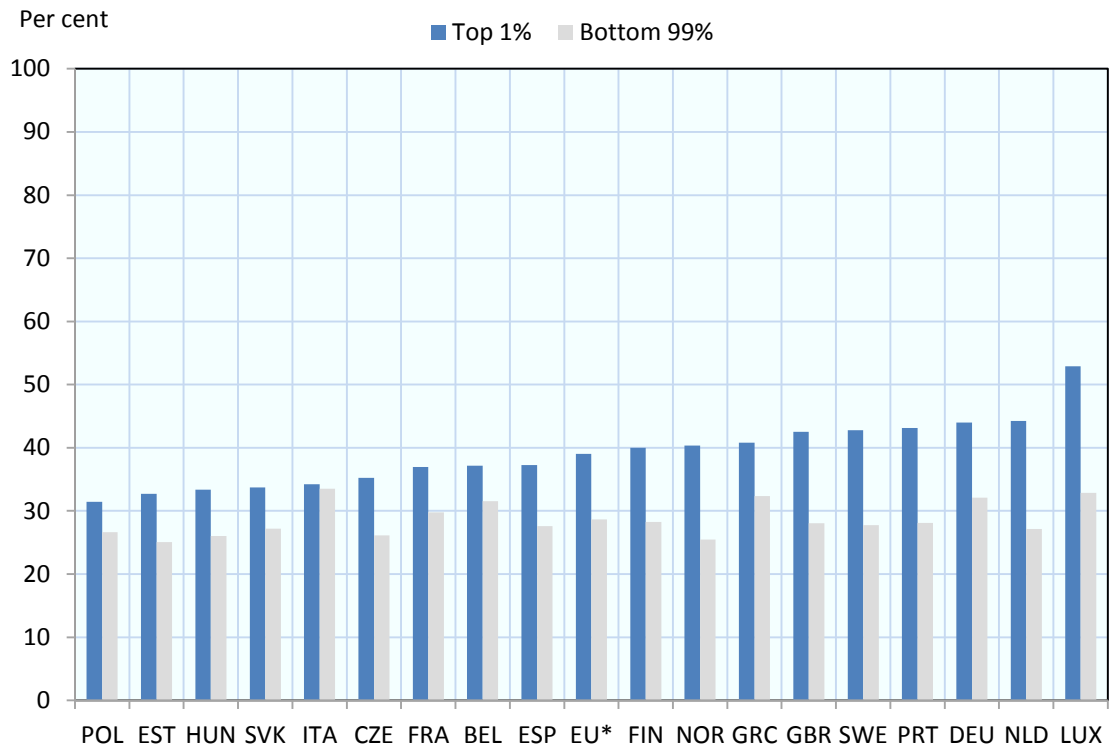


Figure A1.2. Share of men

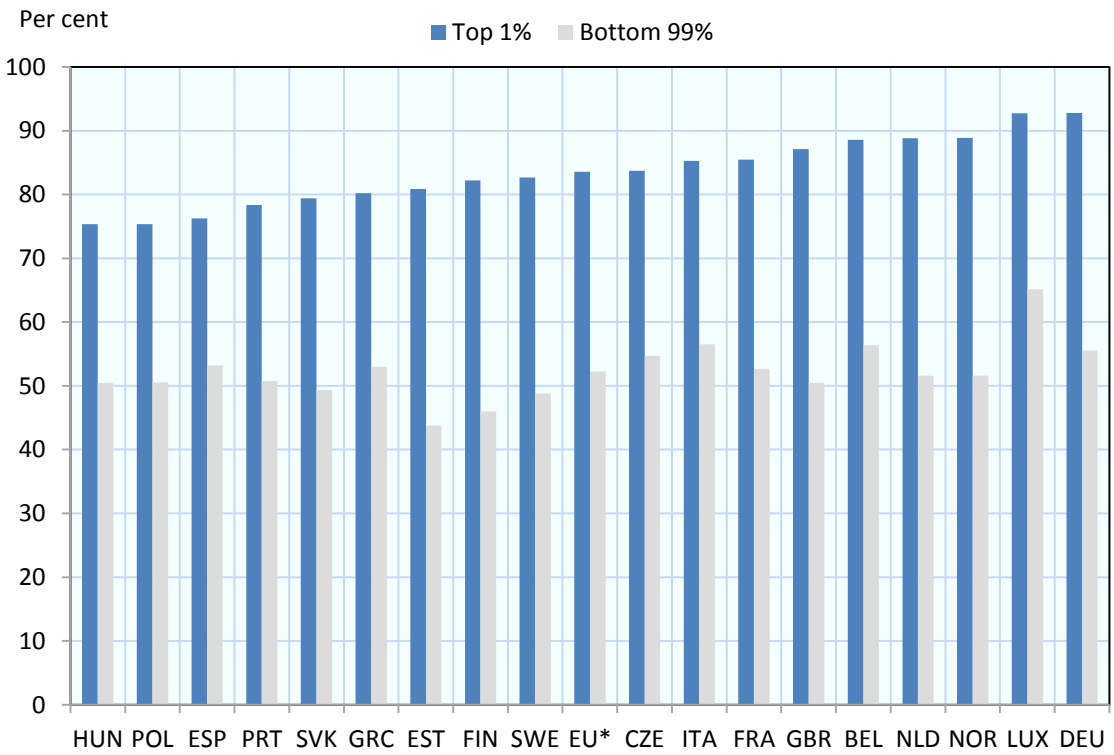


Figure A1.3. Share of tertiary graduates

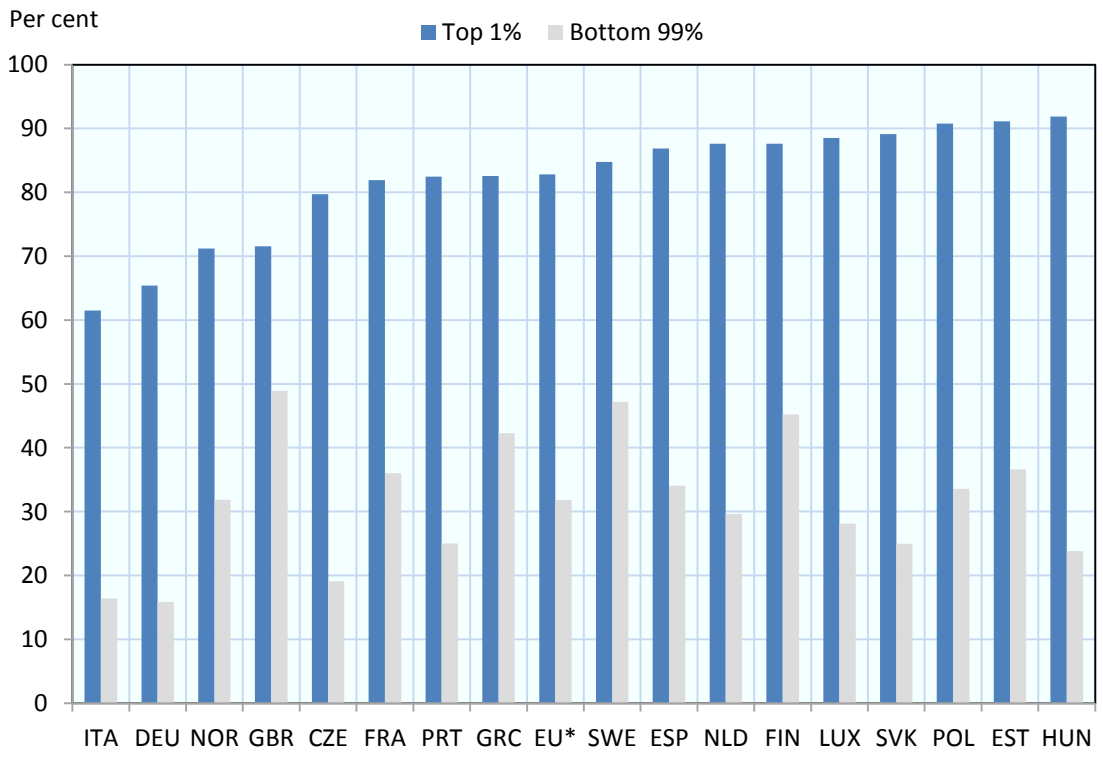


Figure A1.4. Average number of years in the firm

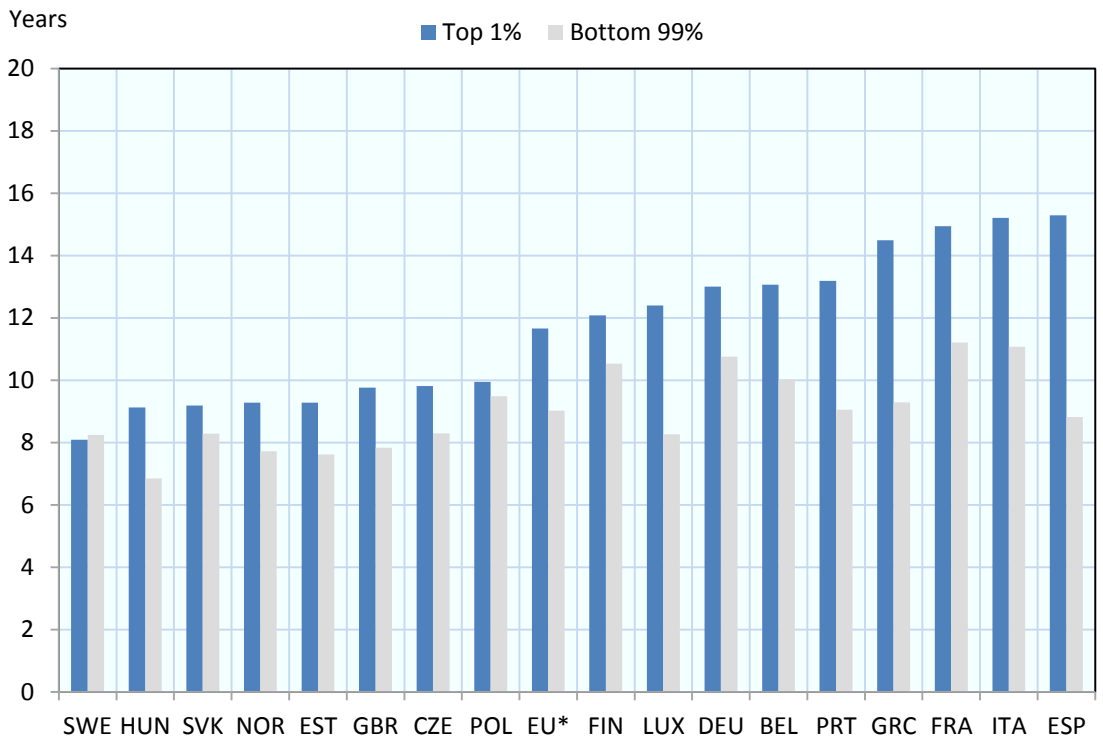


Figure A1.5. Share of employees in information & communication and finance & insurance

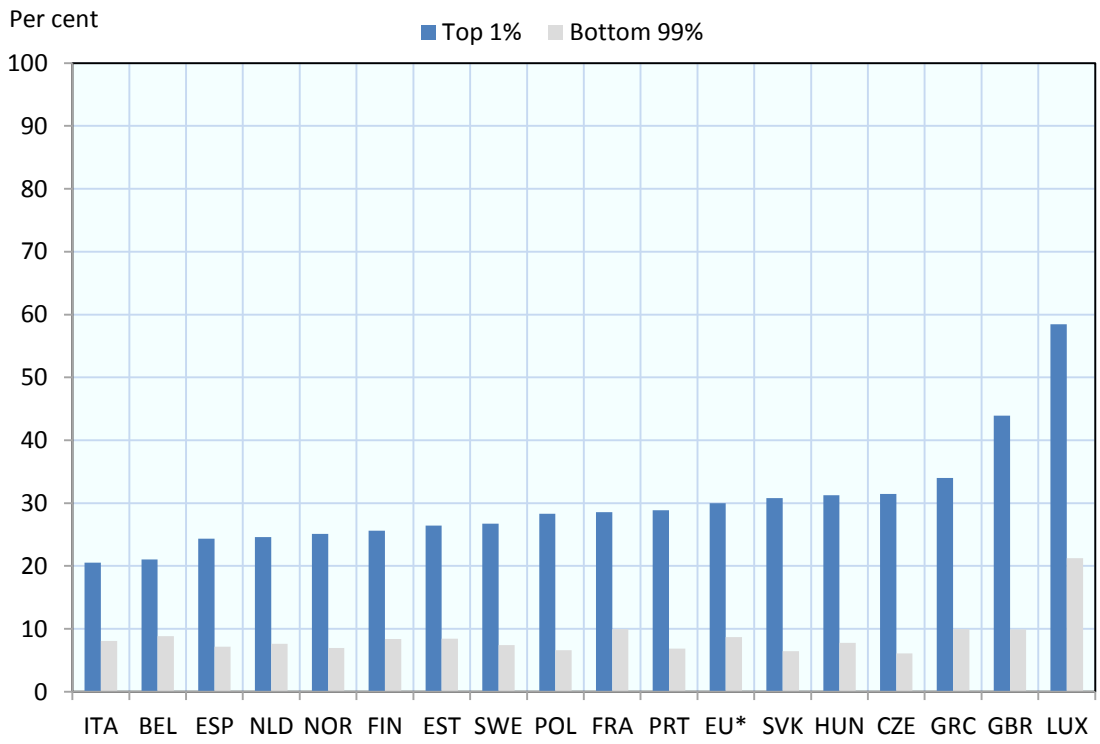
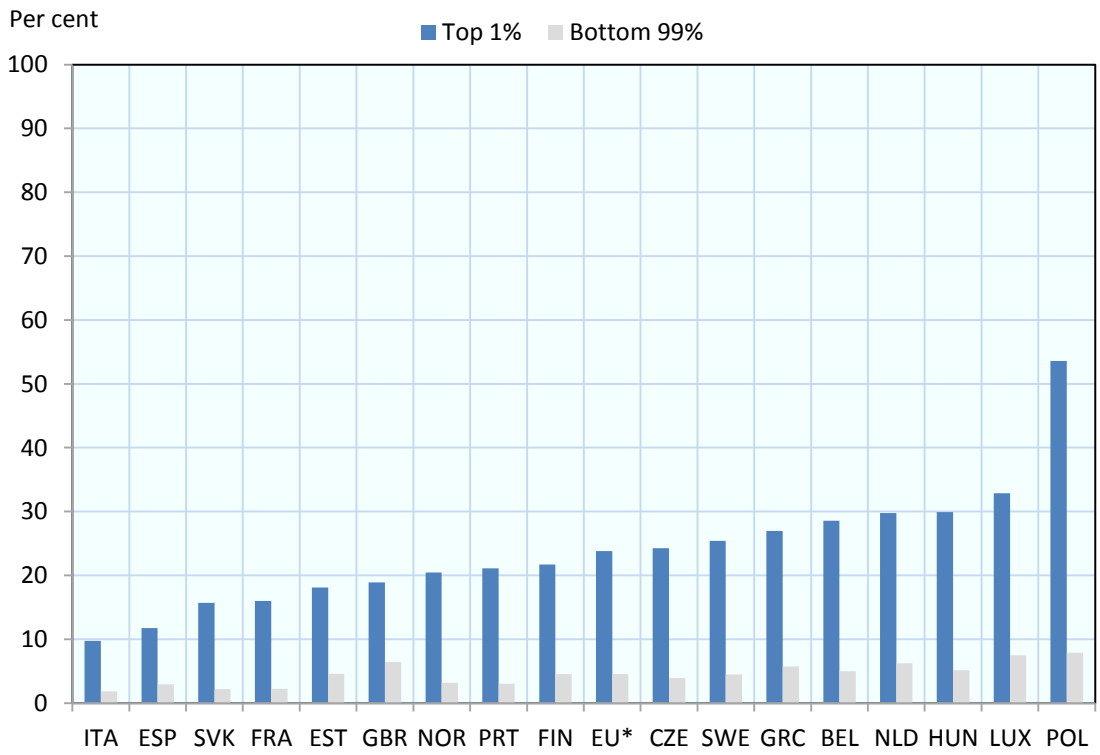


Figure A1.6. Share of employees who are top executives or business/finance professionals



APPENDIX A2. INDIVIDUAL COUNTRY PROFILES

56. This appendix contains individual country profiles on the characteristics of the top 1% earners and the bottom 99% earners. The source underlying the figures is author calculations using the Eurostat Structure of Earnings Survey. All statistics are expressed in per cent. The data define industry and occupation classifications somewhat differently for Germany, which does not allow matching the categories as for the other countries in Panels E and F of Figure A2.6.

Figure A2.1. Belgium: The top 1% and the bottom 99%

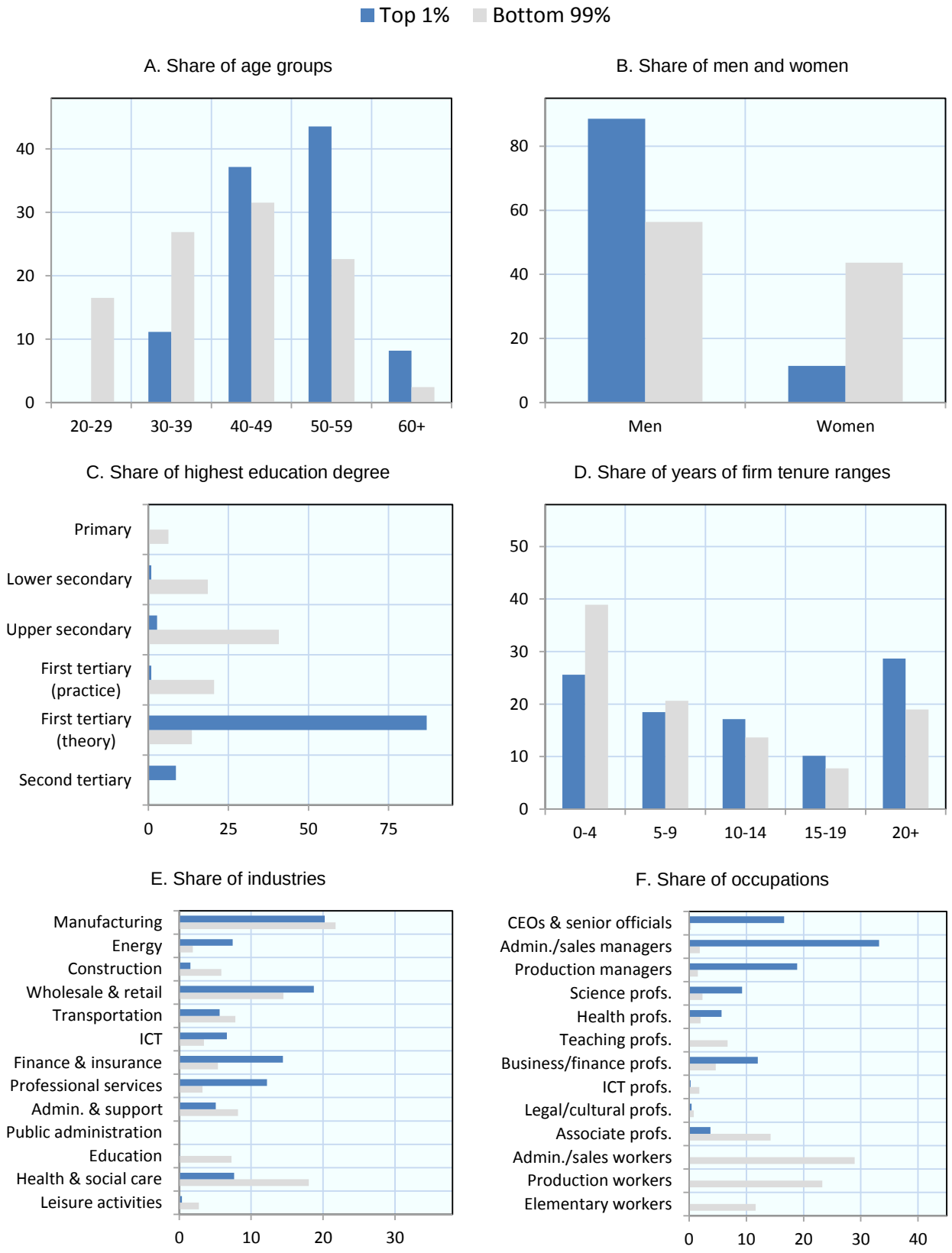


Figure A2.2. Czech Republic: The top 1% and the bottom 99%

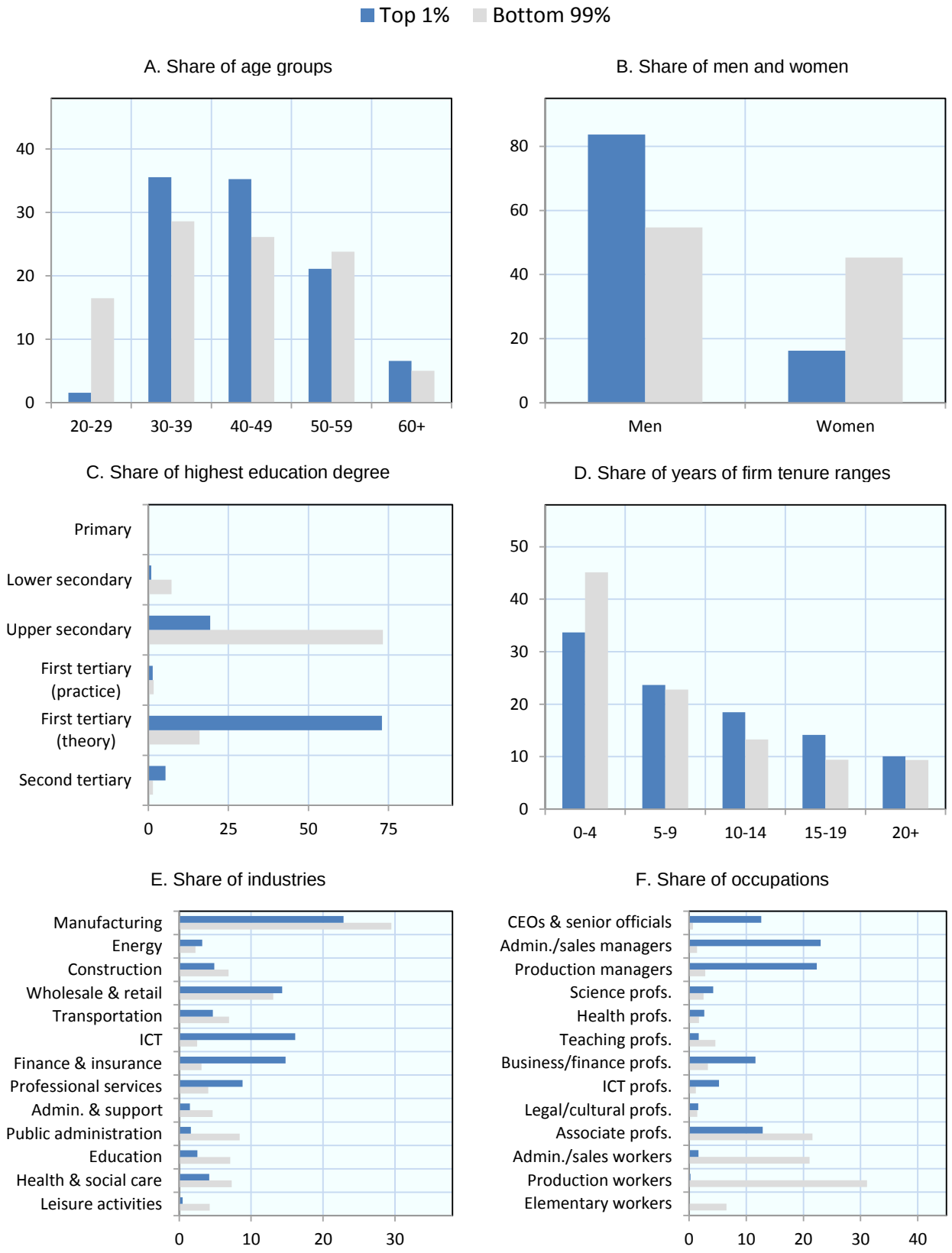


Figure A2.3. Estonia: The top 1% and the bottom 99%

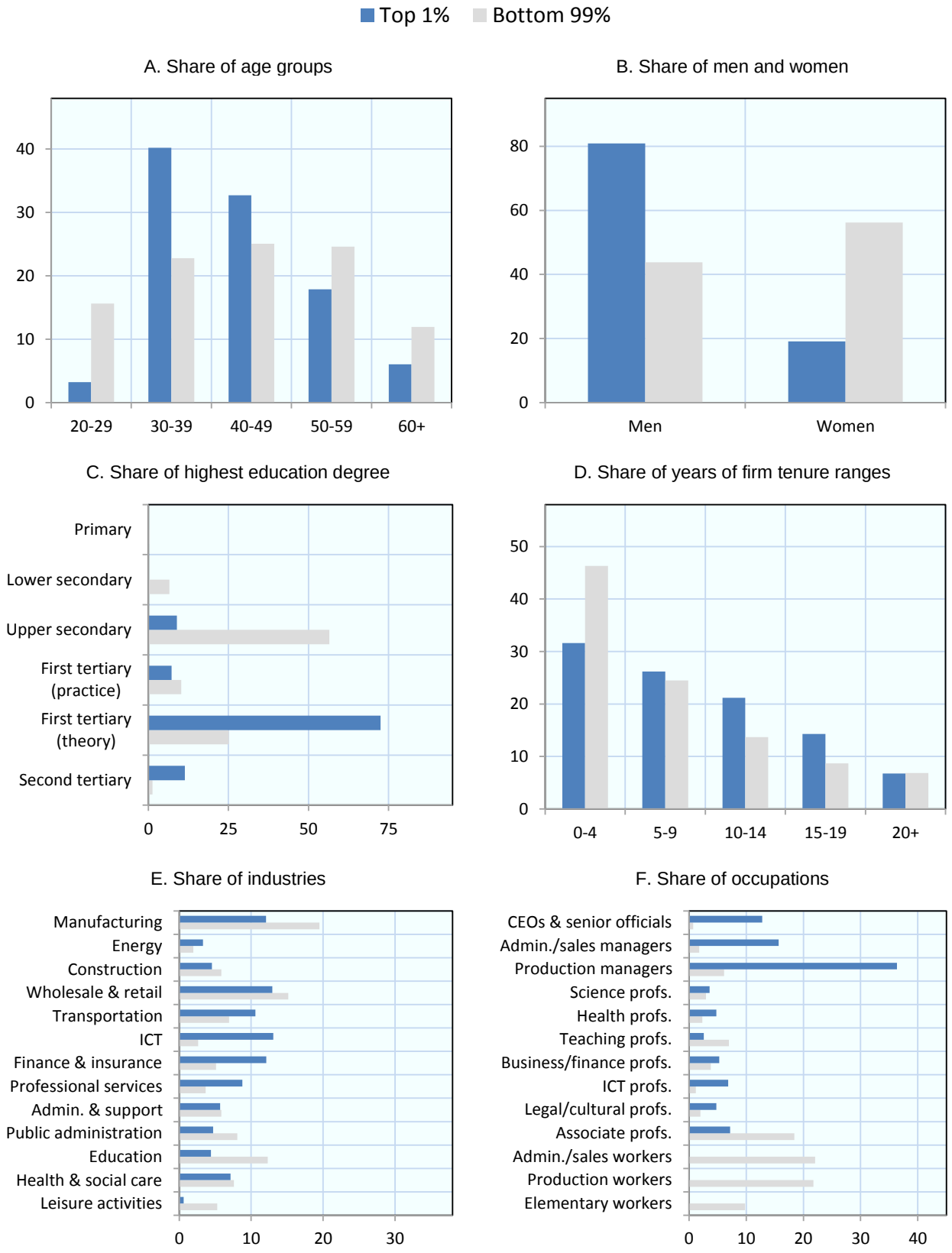


Figure A2.4. Finland: The top 1% and the bottom 99%

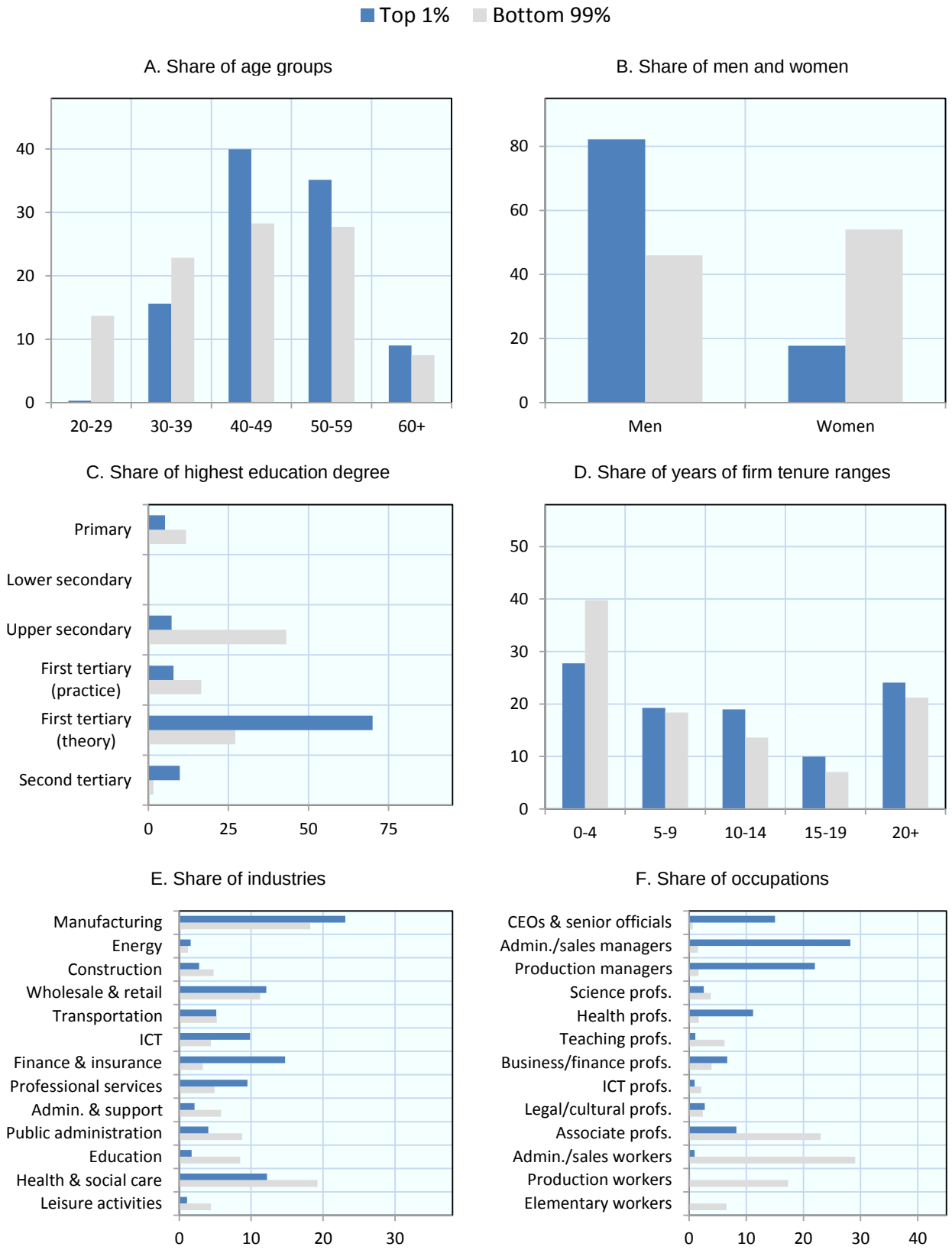


Figure A2.5. France: The top 1% and the bottom 99%

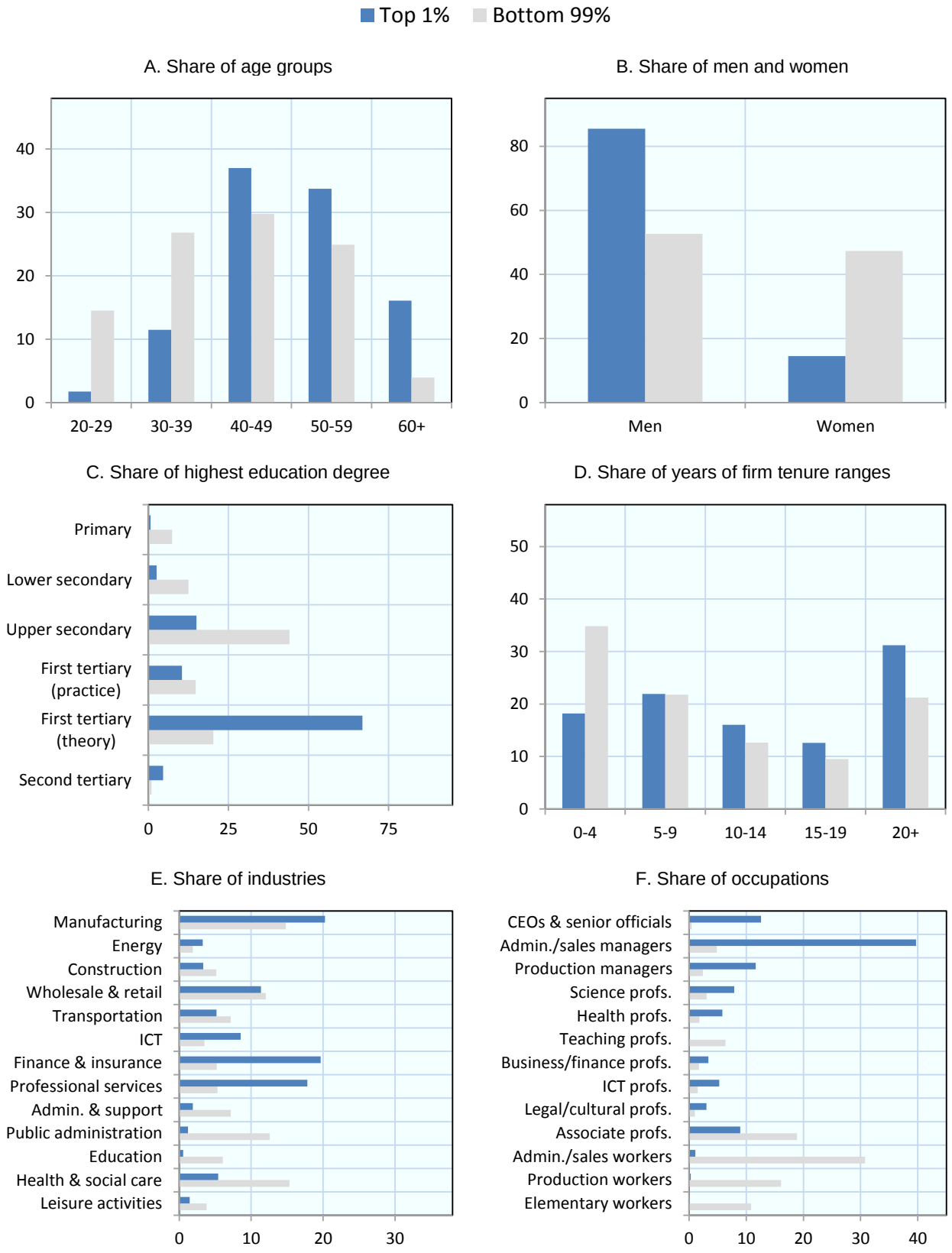


Figure A2.6. Germany: The top 1% and the bottom 99%

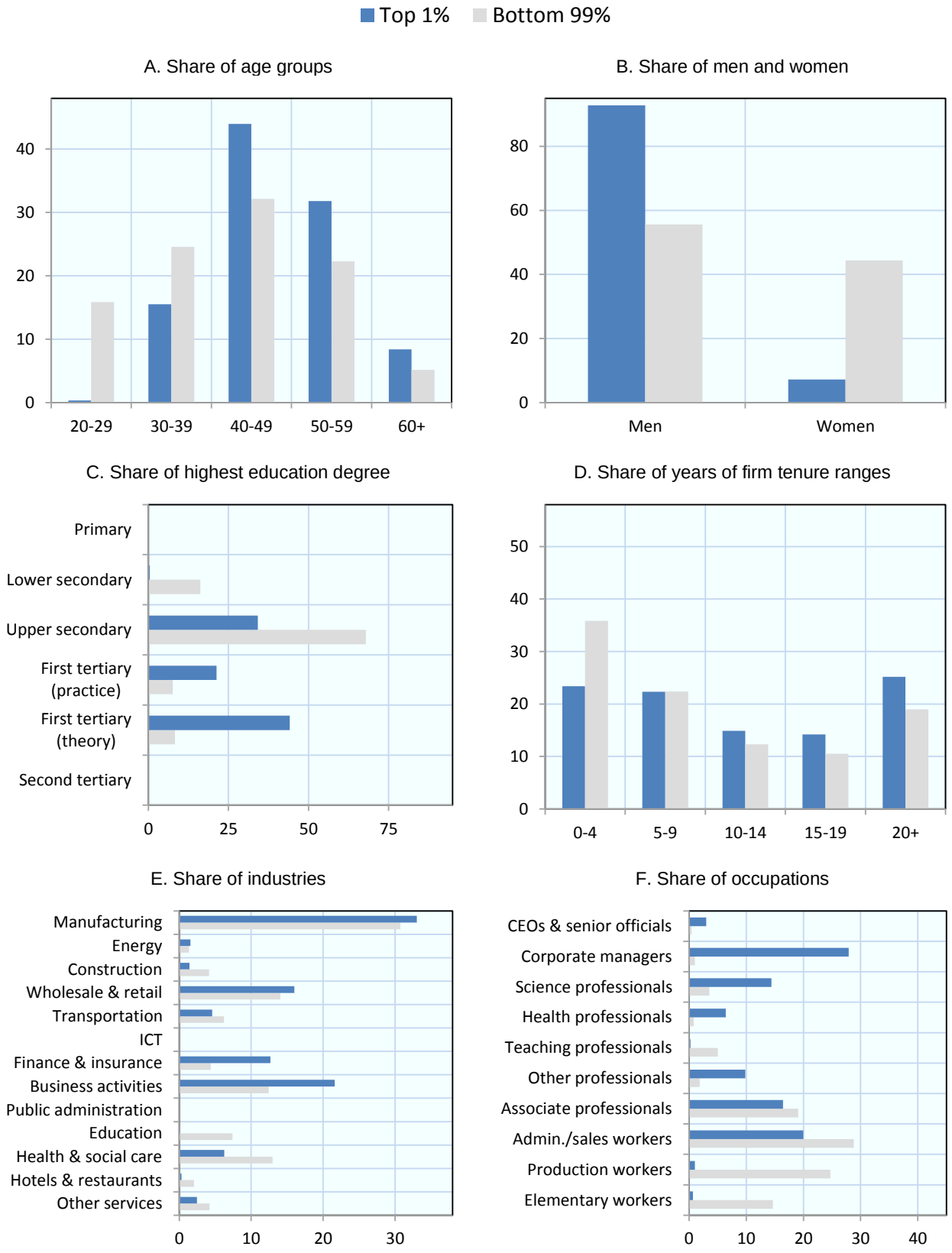


Figure A2.7. Greece: The top 1% and the bottom 99%

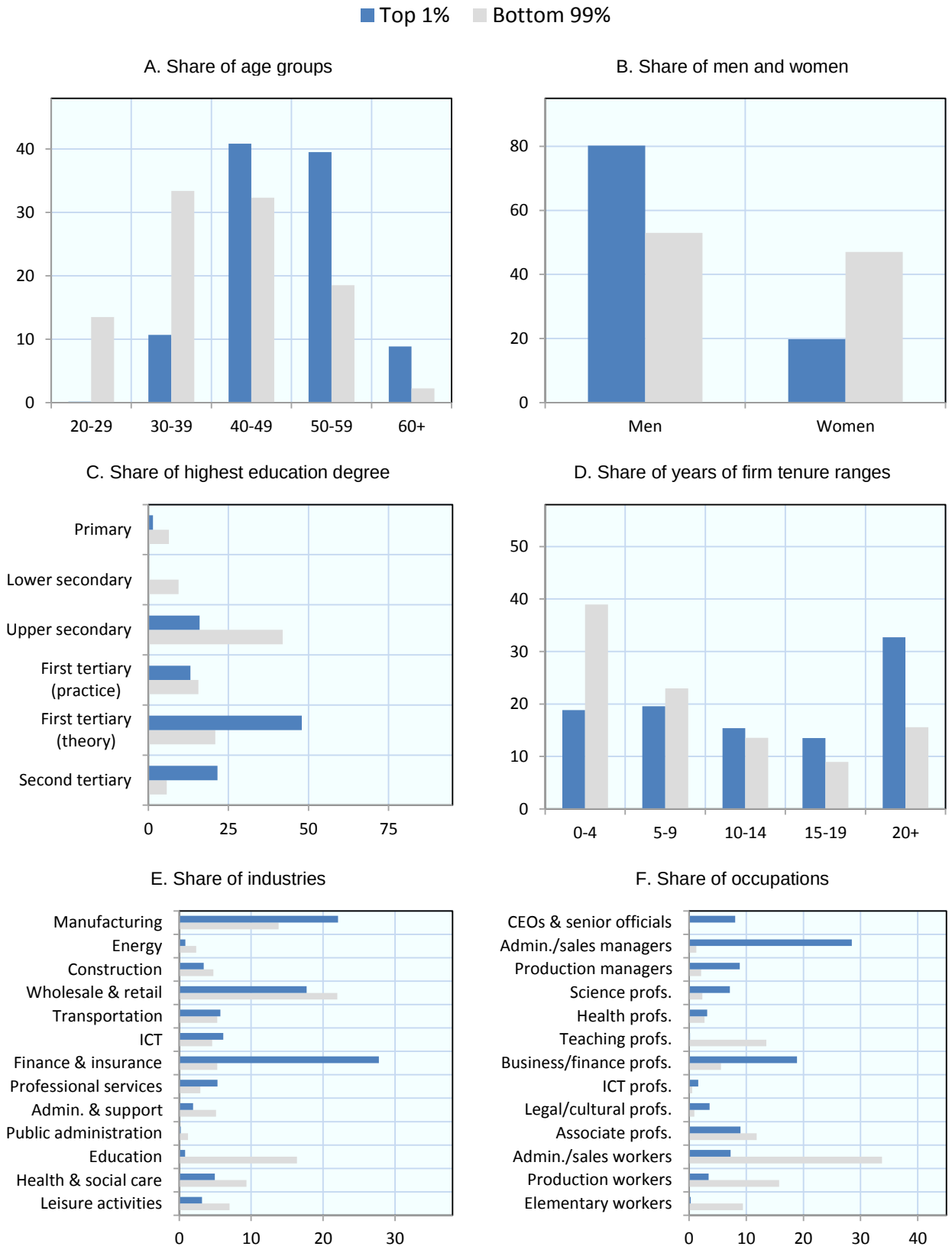


Figure A2.8. Hungary: The top 1% and the bottom 99%

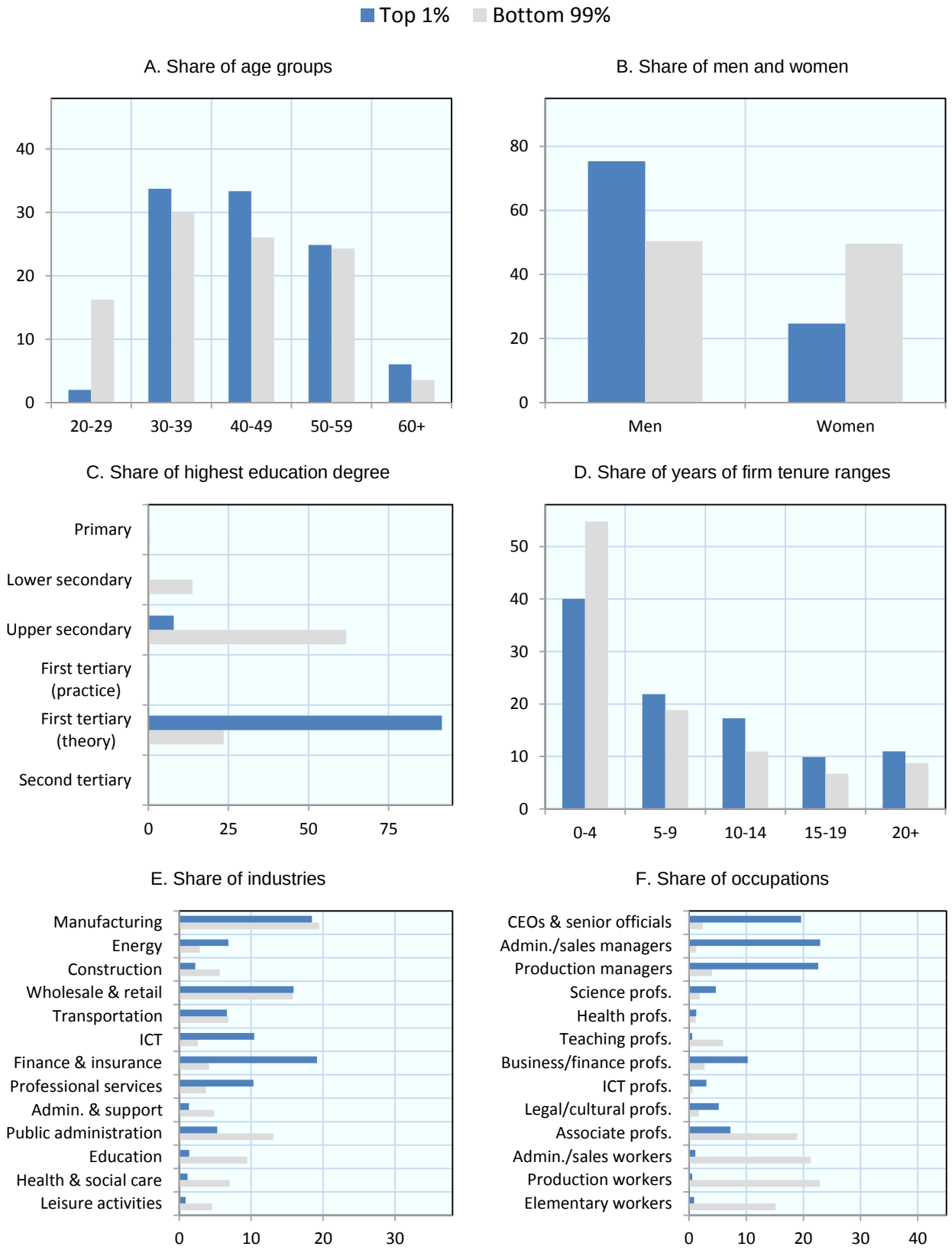


Figure A2.9. Italy: The top 1% and the bottom 99%

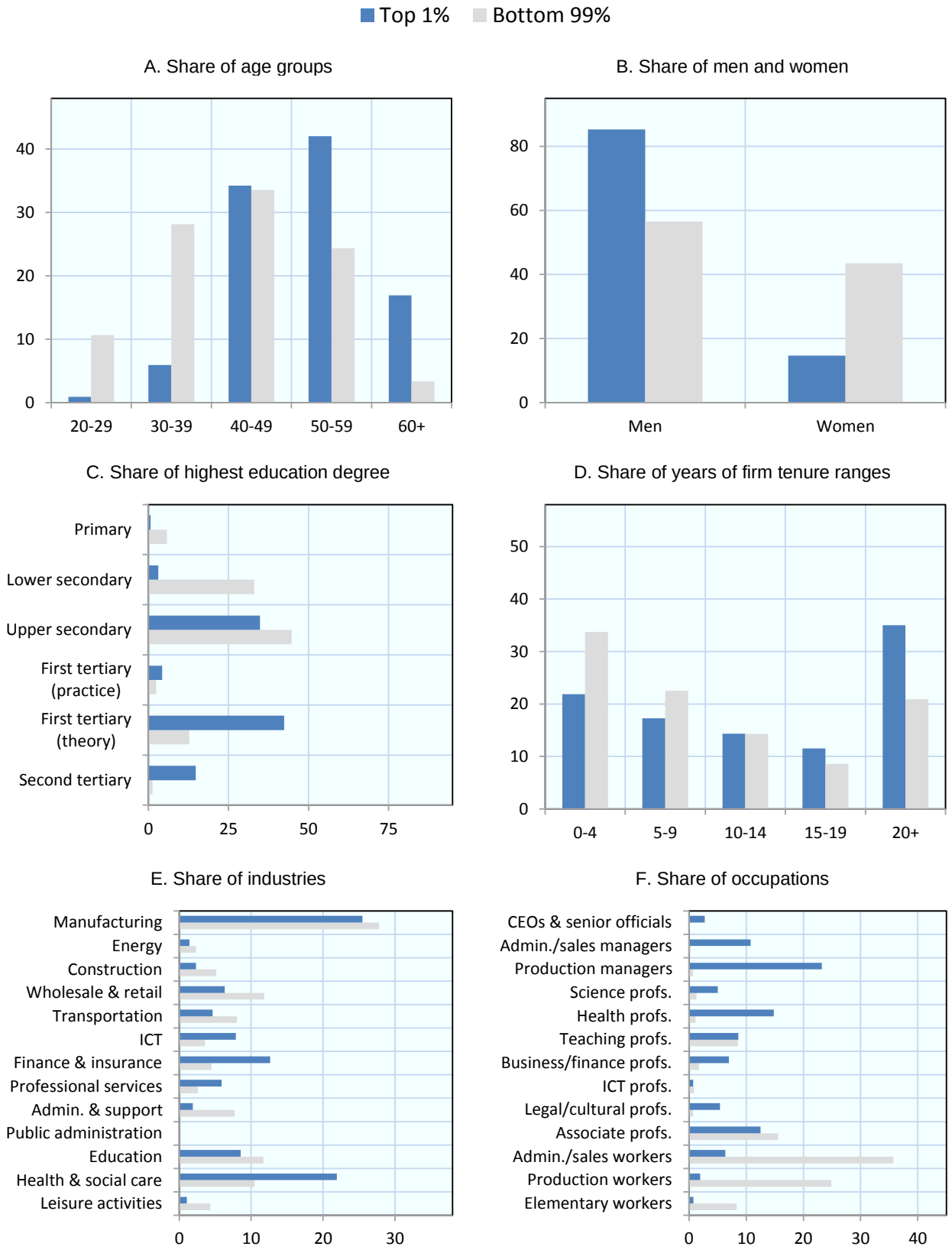


Figure A2.10. Luxembourg: The top 1% and the bottom 99%

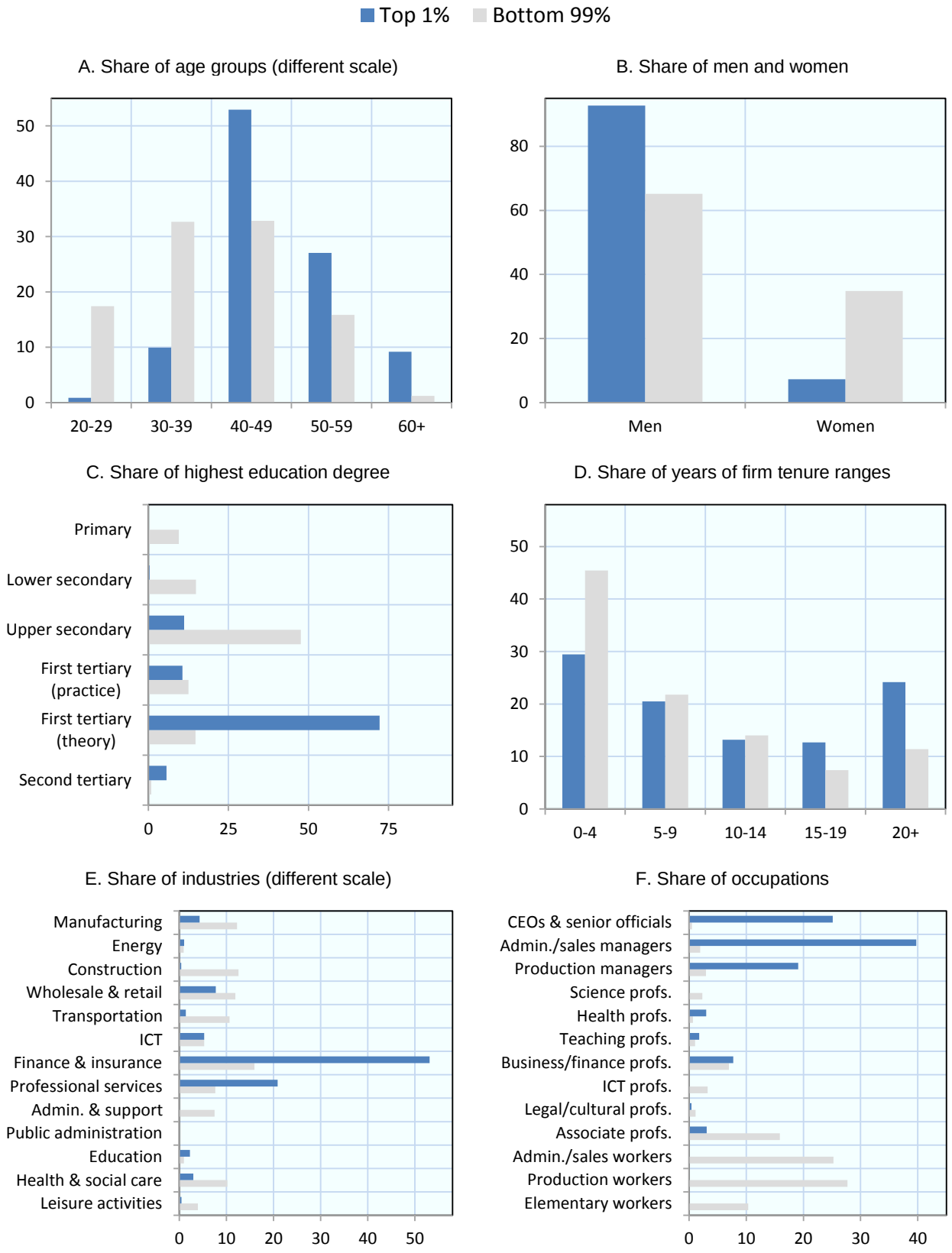


Figure A2.11. Netherlands: The top 1% and the bottom 99%

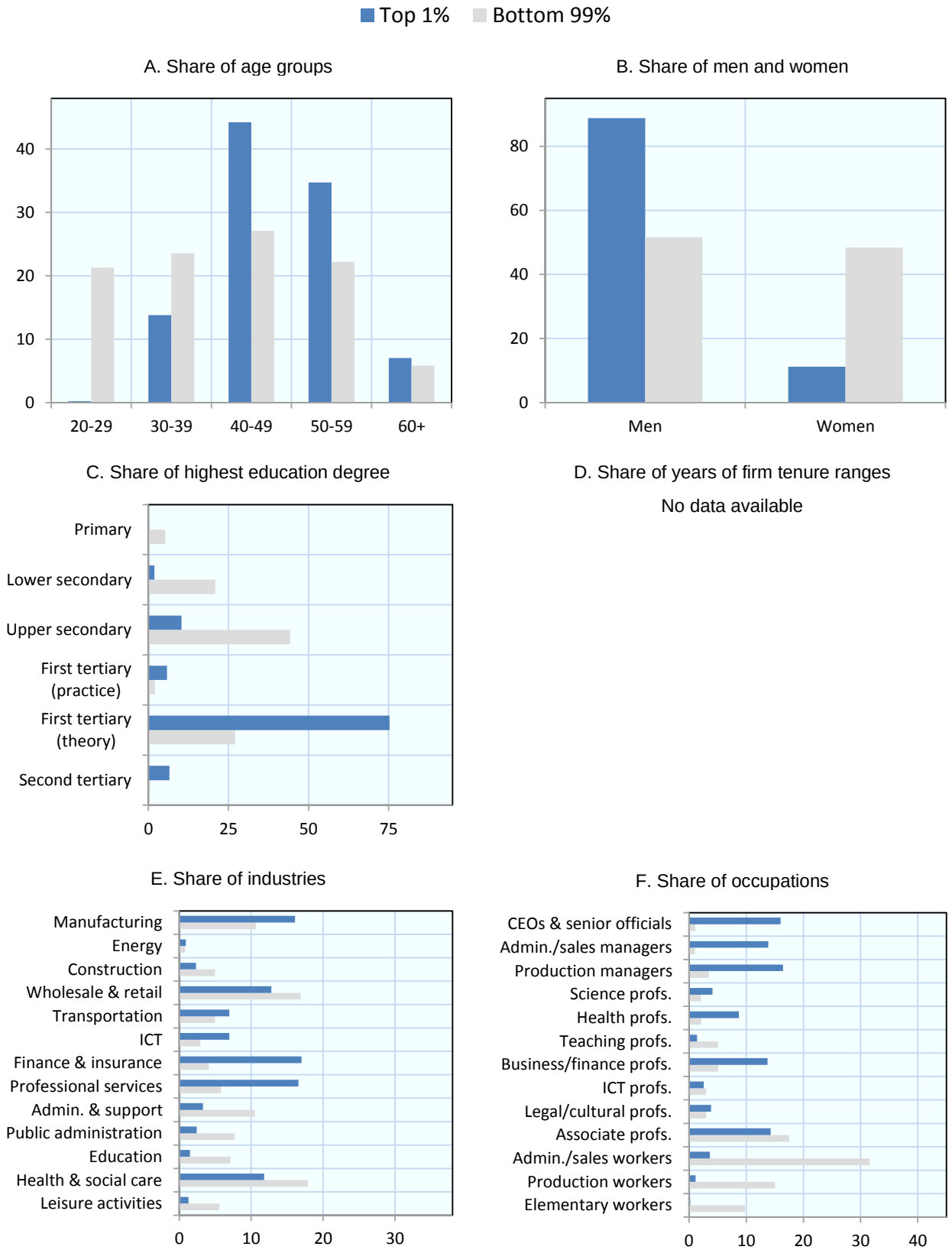


Figure A2.12. Norway: The top 1% and the bottom 99%

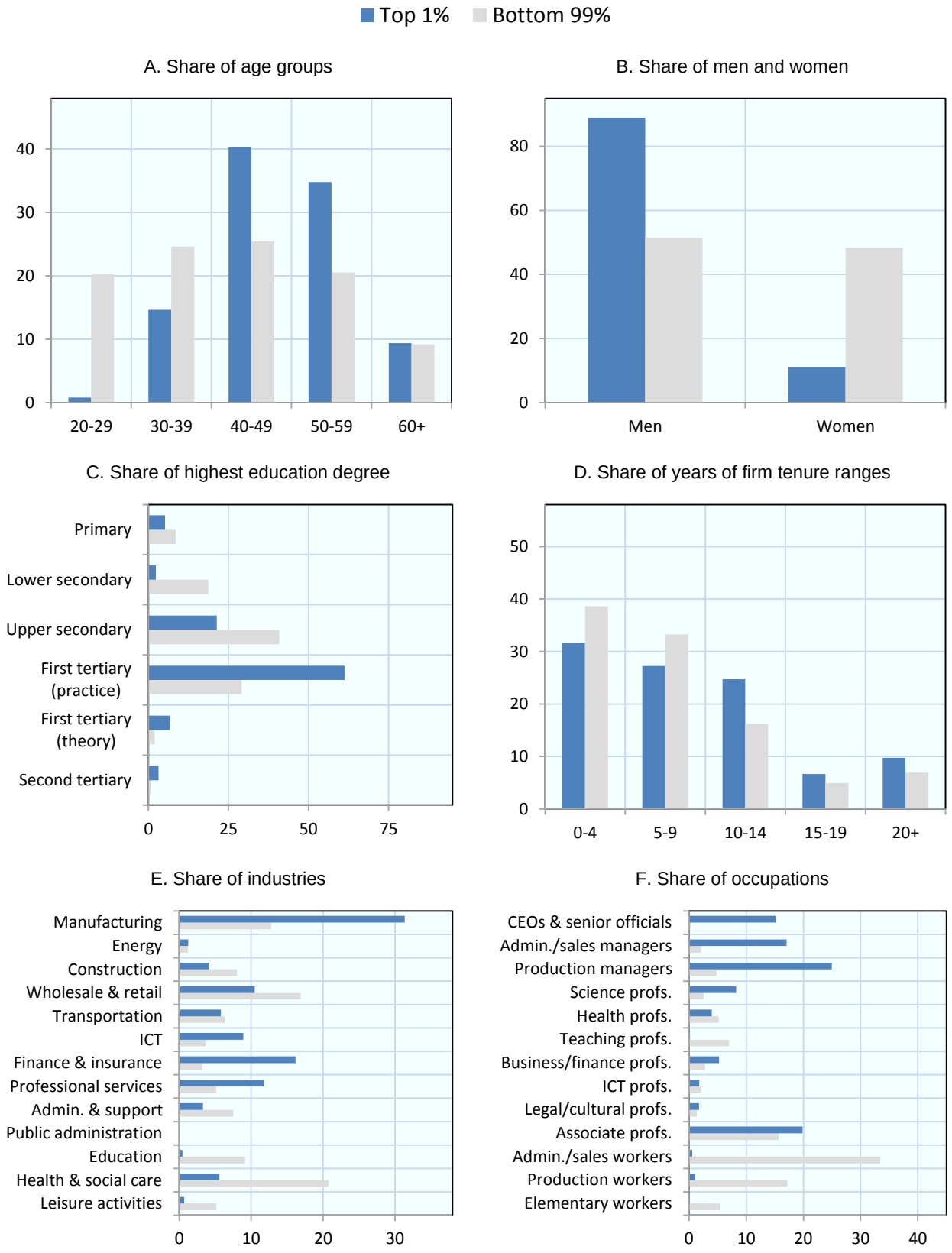


Figure A2.13. Poland: The top 1% and the bottom 99%

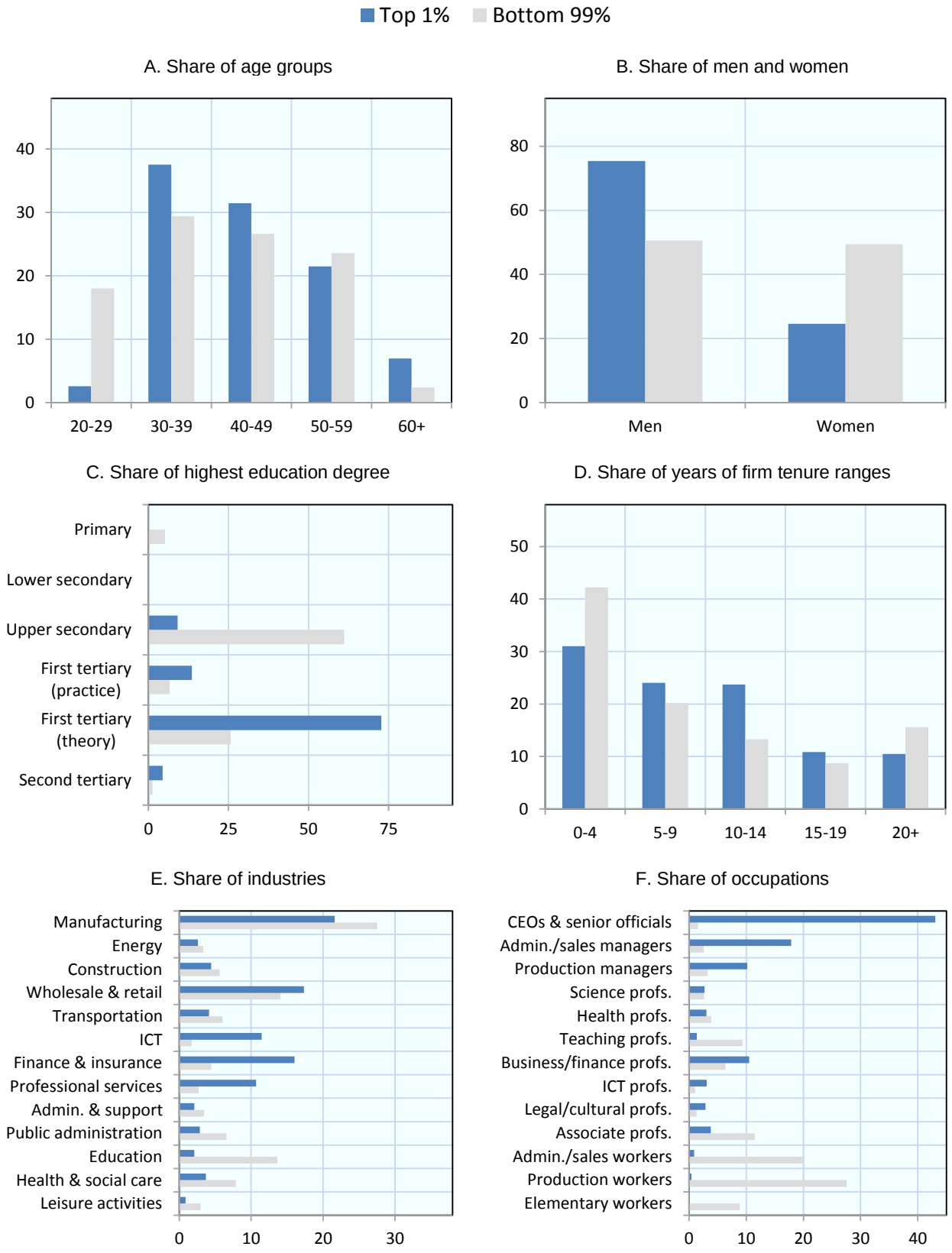


Figure A2.14. Portugal: The top 1% and the bottom 99%

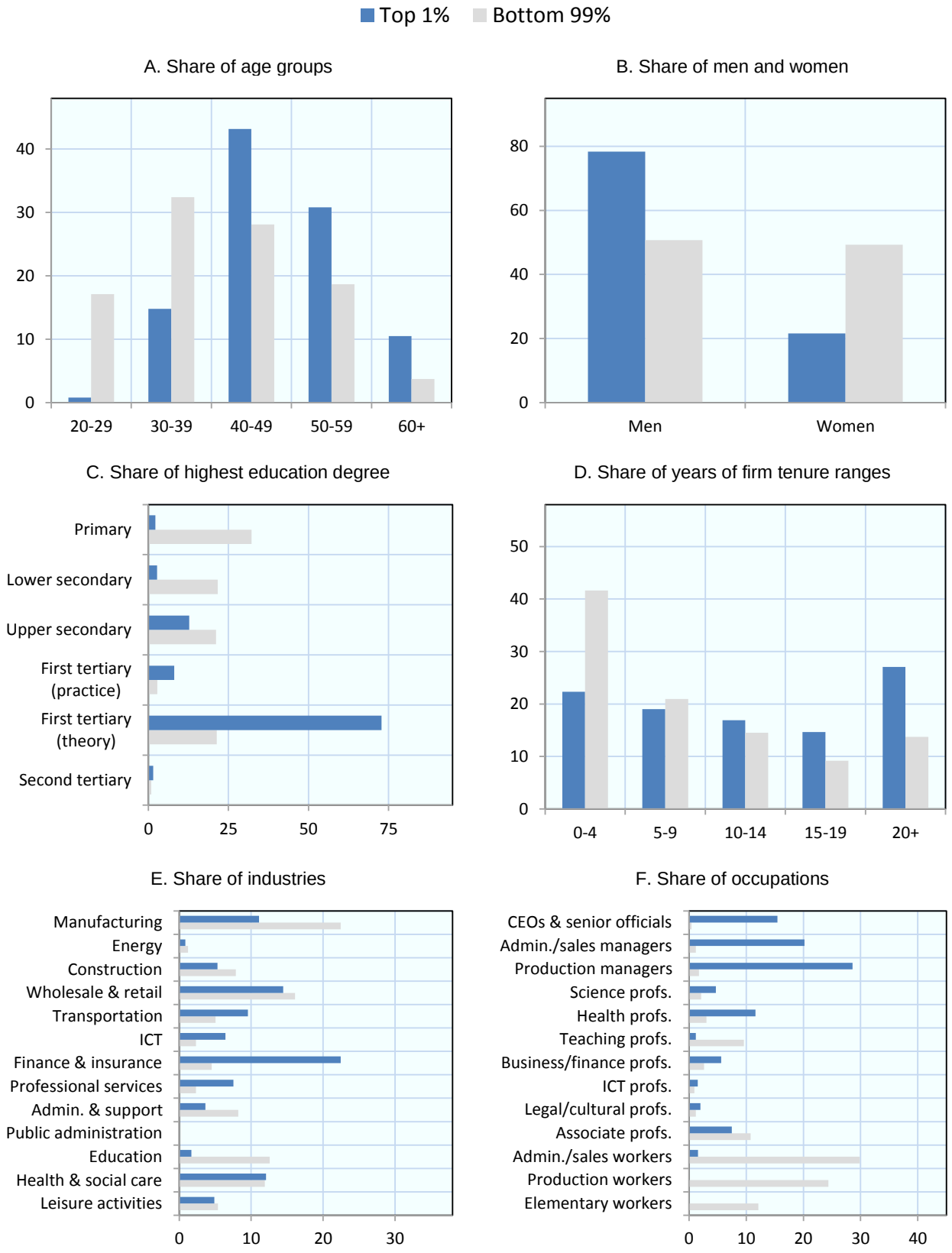


Figure A2.15. Slovak Republic: The top 1% and the bottom 99%

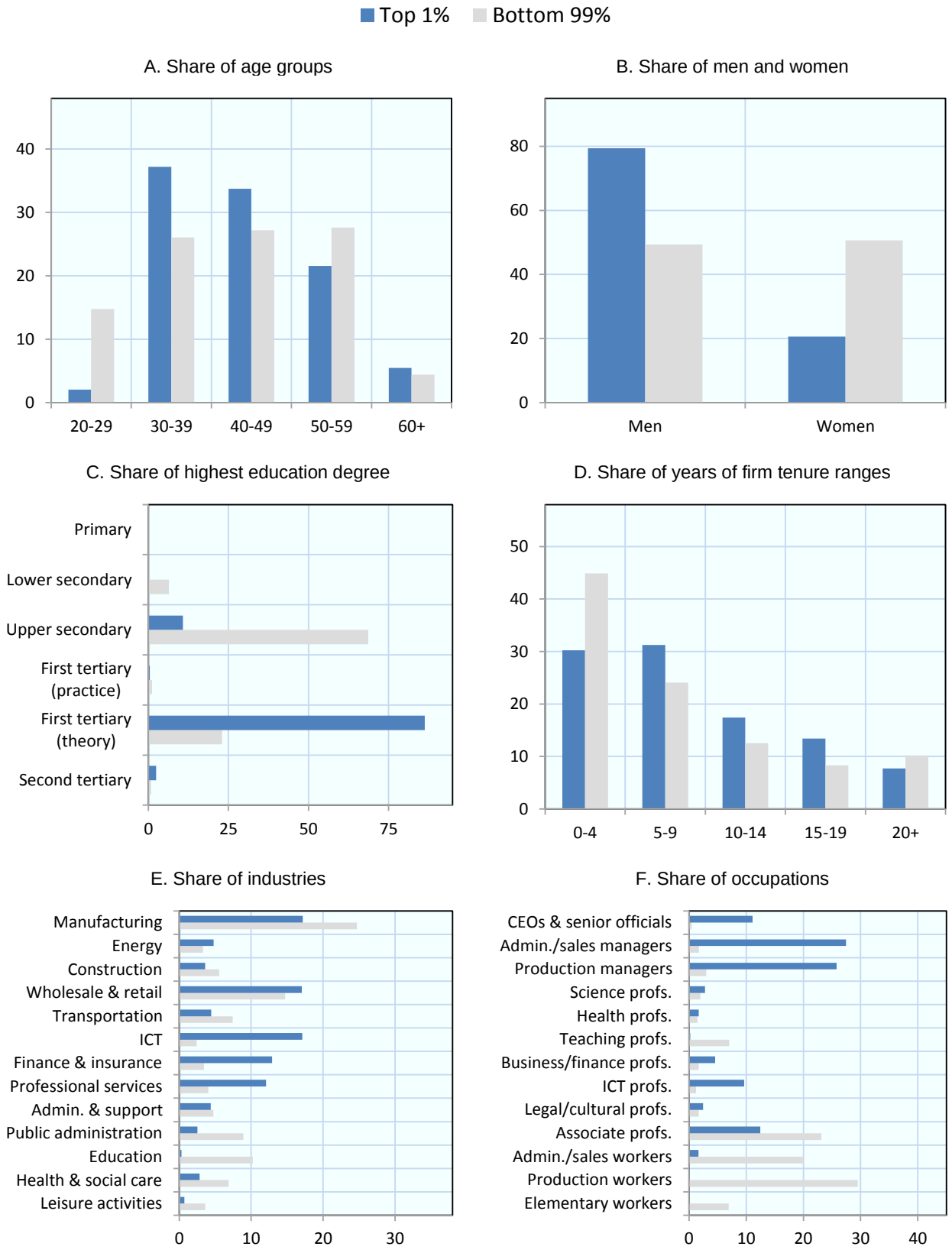


Figure A2.16. Spain: The top 1% and the bottom 99%

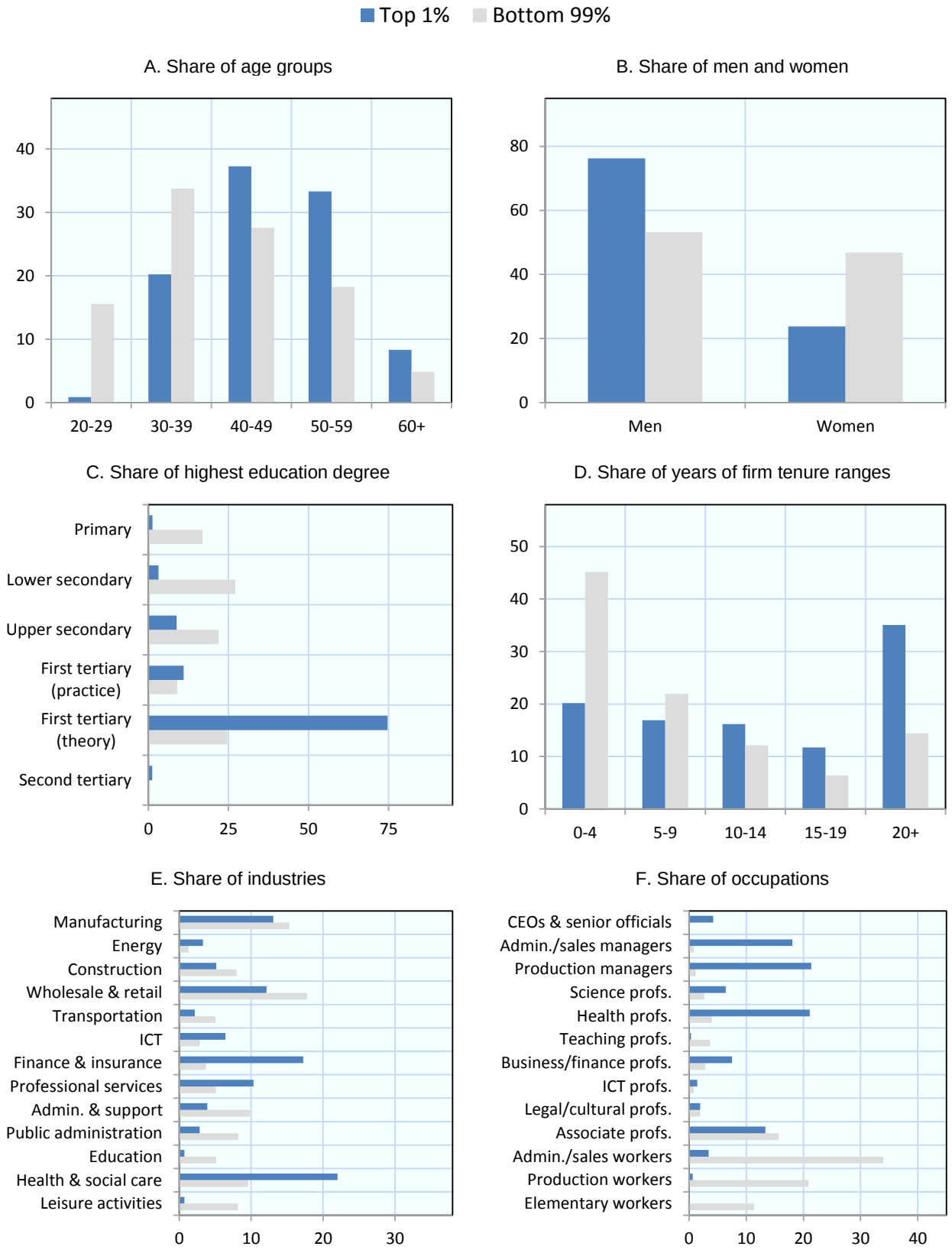


Figure A2.17. Sweden: The top 1% and the bottom 99%

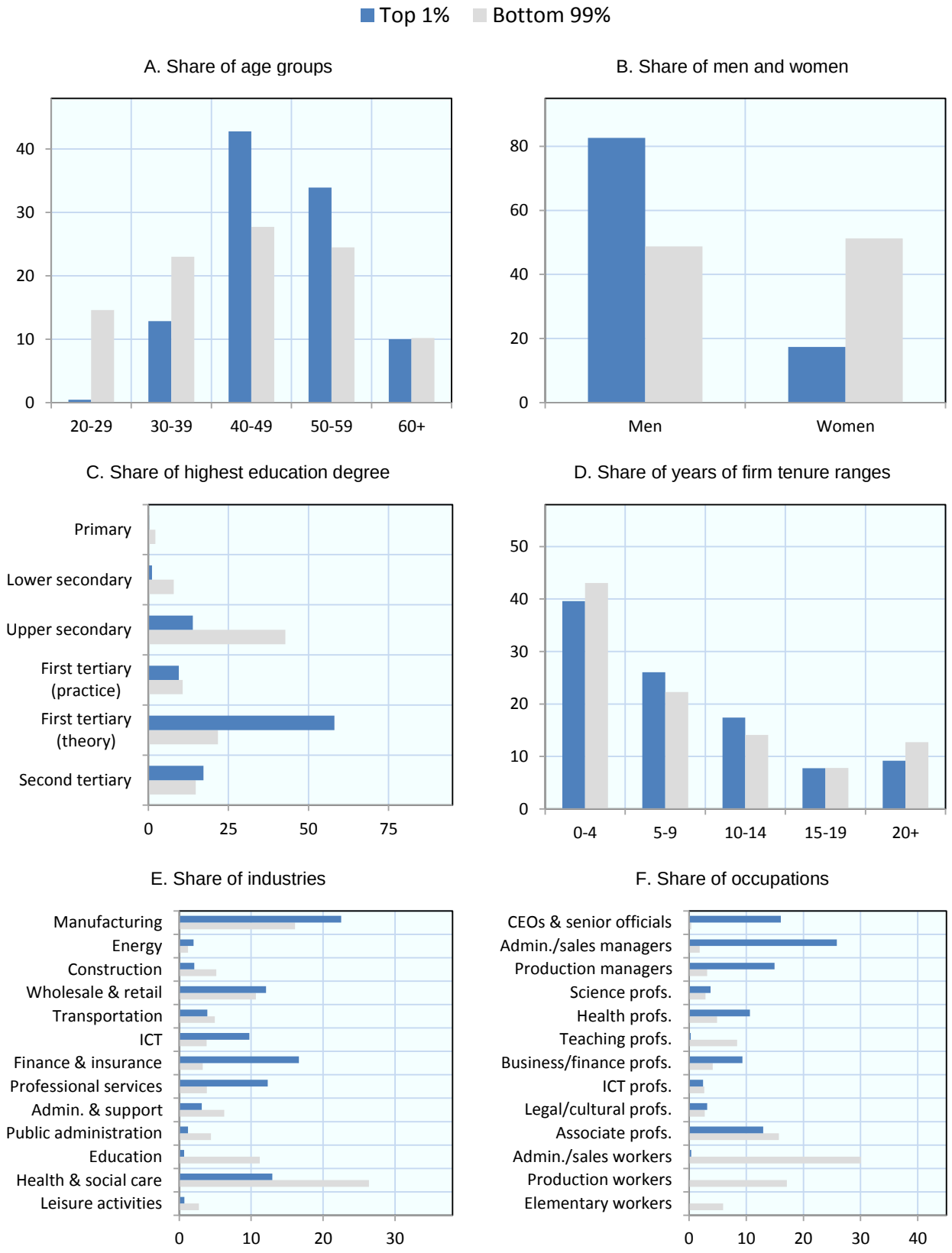
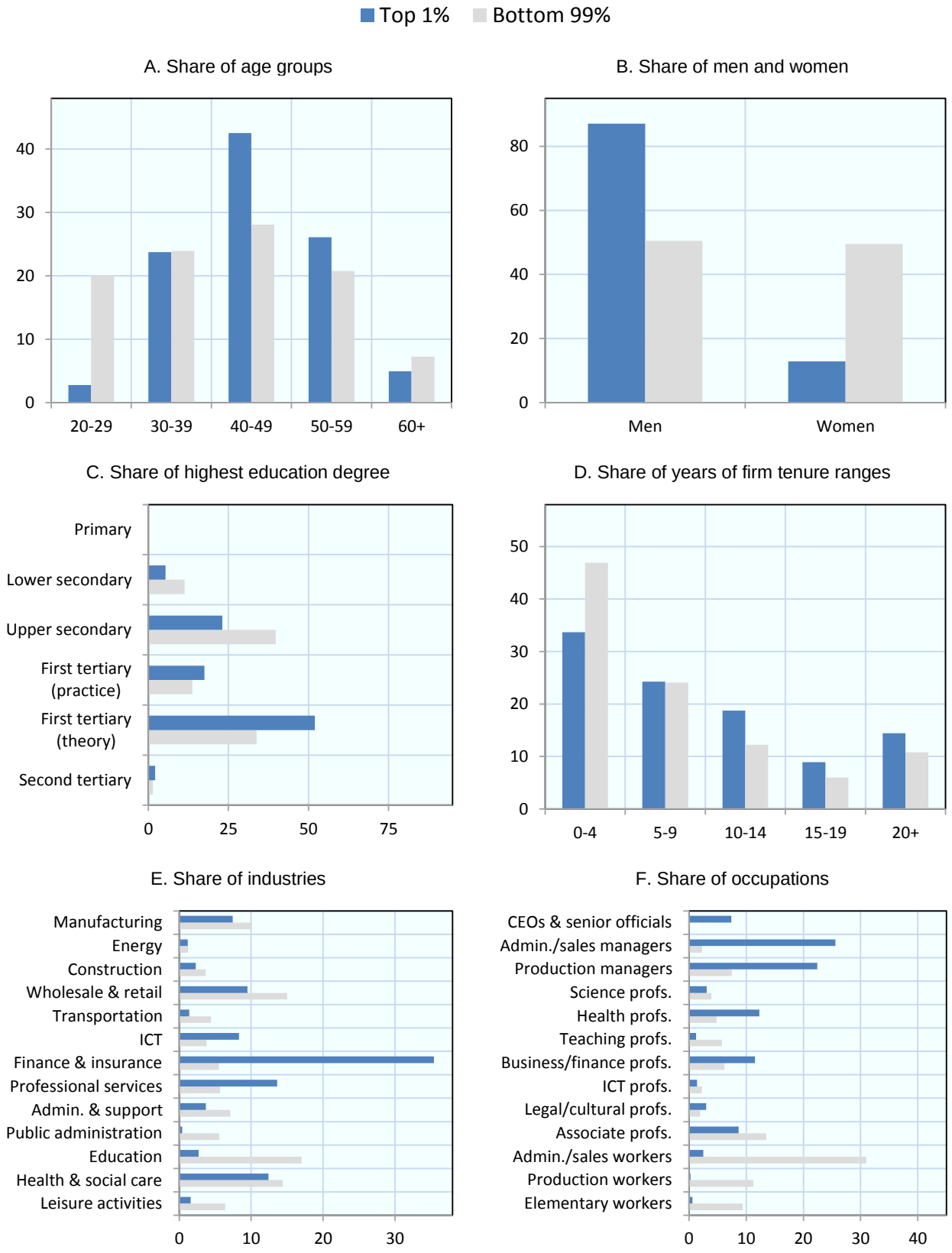


Figure A2.18. United Kingdom: The top 1% and the bottom 99%



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