How Representative Are Social Partners in Europe? The Role of Dissimilarity

Marta Martínez Matute
Pedro S. Martins

I Z A Institute
of Labor Economics
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Marta Martínez Matute
Universidad Autónoma de Madrid and IZA

Pedro S. Martins
Universidade Nova de Lisboa and IZA

ABSTRACT

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Social partners (trade unions and employers' associations) and their representativeness can shape labour institutions and economic and social outcomes in many countries. In this paper, we argue that, when examining social partners' representativeness, it is important to consider both affiliation rates and dissimilarity measures. The latter concerns the extent to which affiliated and non-affiliated firms or workers are distributed similarly across relevant dimensions, including firm size. In our analysis of the European Company Survey, we find that affiliation density and dissimilarity measures correlate positively across countries, particularly in the case of employers' associations in which we focus. This result also holds across employers' associations when we use more detailed, firm population data for Portugal. We conclude that higher affiliation densities do not necessarily correspond to more representative social partners as they can involve greater dissimilarity between affiliated and non-affiliated firms.

JEL Classification:	J50, J23, L22
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Corresponding author:
Pedro S. Martins
School of Business and Management
Queen Mary University of London
Mile End Road
London E1 4NS
United Kingdom
E-mail: p.martins@qmul.ac.uk

1 Introduction

Social dialogue is an important pillar of the economies and societies of many countries around the world, in particular in Europe. The dialogue between social partners - workers' representatives, on the one hand, and employers' representatives, on the other - is thought to promote a more harmonious society, with a good alignment between individual and social goals, more equitable sharing of the benefits from economic growth, and higher resilience in periods of crisis. Social dialogue is thus an important dimension of the labour process and the organization of production and a driver of the relationship between organisations and markets.

A practical dimension of social dialogue is collective bargaining, in which social partners determine minimum working conditions that apply to firms, industries or even the entire workforce. Social partners can also play important roles in setting national minimum wages, shaping employment law, providing training, and coordinating social security, public employment services, and labour inspectorates (Boeri 2012, Behrens & Helfen 2016, OECD 2019, Visser 2019). At the same time, social partners can also engage in insider-outsider or even collusion practices, with detrimental effects (Krueger & Ashenfelter 2018, Hijzen & Martins 2020, PataULT & Valtat 2020, Bassanini et al. 2022).

Given the potential wide remit and effects of social partners, their representativeness can therefore be very relevant for different socio-economic outcomes and the success of the social dialogue model. For instance, if only a small share of workers is affiliated with trade unions, it may be more likely that the preferences of trade unions in at least some of the dimensions above (e.g. minimum wages) will not reflect those of the workforce. Similarly, if only a handful of firms in a sector are affiliated in the sector's employers' association (EA henceforth), the resulting collective bargaining agreements or other dimensions may not be appropriate from the perspective of the potentially many firms that are not represented in such collective bargaining. Note that employers have been traditionally less unified as social group than workers because of their heterogeneity (Schmitter & Streeck 1999). Their differences in size, structure, capital use, managerial styles and the employers' exposure not only to labour markets but also to product markets made it more difficult to define a set of common objectives in their representation and define the limits of the capacity of EAs to substitute grouping individual interests (Windmuller & Gladstone 1984). The resulting social dialogue might thus not be optimal: first, employers may not be affiliated to the EAs negotiating

the relevant agreements and, second, employers may be affiliated but their EA may fail to represent their specific interests. These organisational matters can have an important effect on business and industry performance (Martins 2020, Cainelli et al. 2021). For instance, employers in smaller companies tend to demand more labour flexibility and are generally in favour of cost (wage) adjustments in case of negative demand shocks (Bank 2009).

As in the examples above, social partners' representativeness has so far been typically equated to their affiliation rates. For instance, in several countries, including Germany and the Netherlands, if an EA represents more than a given percentage of the firms in its sector (50% or 55%), it is regarded as representative. Its collective agreements can then be extended towards all other (non-affiliated) firms in the sector and to all employees (even those not affiliated with any trade union) (Haucap et al. 2001, OECD 2019, ?). France adopts a long list of criteria in determining the representativeness of its EAs, including the number of registered firms or of their employees[1]. In an important study, Eurofound (2016) indicate that 'legal conformity', including legislative thresholds regarding employer coverage, union elections, or union membership or density, is a key driver for representativeness in seven European countries. Moreover, in eleven other countries both legal conformity and 'mutual recognition' (by both sides in collective bargaining) are important for representativeness.[2]

This paper provides a methodological contribution to the measurement of the representativeness of social partners. We argue that such measurement should be conducted not only from the perspective of affiliation rates but also through the lenses of *dissimilarity* indices. The latter measure the extent to which the distribution of observations of a particular type across different units mirrors the same distribution for observations of a different type (Duncan & Duncan 1955). For instance, EA affiliation rates may be high but also based exclusively on large affiliated firms or firms with other specific characteristics. This type of situations highlights tensions between the two representativeness perspectives above. Again, the preferences of affiliated firms may be very different from those of their non-affiliated counterparts, potentially impairing the economic and social goals described above.

While dissimilarity indices have already been applied in analyses of gender, racial or ethnic

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[1]Other criteria include the 'respect for republican values', independence, financial transparency, and activity of at least two years: `link`

[2]In eleven other countries, mutual recognition is the key driver of representativeness. Eurofound (2016) also indicates that, between 1999 and 2015, eleven countries (out of the 28 EU members and Norway) enacted legal measures affecting representativeness. Note that the European Commission also uses 'representativeness' criteria to identify social partner organisations with the legal right to be consulted at the European level (Kroeger 2013).

segregation across neighbourhoods, schools, occupations or workplaces (Hellerstein & Neumark 2008, Glitz 2014, Andrews et al. 2017, Firmino et al. 2020), we believe we are the first to propose them in the context of industrial relations and labour economics. Specifically, we compare the distributions of firms affiliated or not in EAs across industry and firm-size categories. We also conduct these comparisons regarding employee representation and for a large number of countries in Europe.

Furthermore, we compare affiliation rates and dissimilarity indices by country across Europe. This allows us to understand if the two variables are aligned (when higher affiliation corresponds to lower dissimilarity) or not. The latter case would arise when affiliation increases stem largely from particular groups, e.g. larger firms, leading to higher dissimilarity. We also conduct a similar analysis comparing firms with employee representation (trade unions or worker councils) and firms without such representation in each country. Finally, we draw on more detailed data for one particular country, Portugal, where we consider additional dimensions of potential dissimilarity on top of firm-size categories and also compare across different EAs.

Our findings indicate that dissimilarity levels are generally large, both in the case of EAs and in the case of trade unions. In other words, we find that, in general, affiliated firms are not distributed similarly to non-affiliated firms, with a distinctive concentration across industries and firm sizes. Indeed, across the 32 countries that we cover, an (employee-weighted) average of 39.4% of the affiliated firms would have to be based at different firm-size/industry pairs to achieve full representativeness.

In our main result, we also find that the dissimilarity index is *positively* correlated with the affiliation rates across countries, both for EAs and trade unions. In other words, countries where the percentage of affiliated firms is higher also tend to exhibit greater differences between the profiles of affiliated and non-affiliated firms. This result highlights the relevance of the dissimilarity approach that we propose here towards a deeper understanding of the representativeness of social partners. The results also underline the complementarity of the dissimilarity approach with the more commonly used affiliation rate metrics. The findings above are also supported by our analysis of the particular case of Portugal, where more detailed data are available, and a number of robustness checks. The analysis of the case of Portugal also indicates that dissimilarity measures have explanatory power with respect to a

number of relevant variables, namely wages levels and wage dispersion.

The remaining of the paper is as follows: Section 2 presents our novel approach based on dissimilarity analysis. Section 3 describes the datasets used in this paper and several descriptive statistics. Sections 4 and 5 present our empirical results of Europe and Portugal, respectively. Finally, Section 6 concludes.

2 Dissimilarity analysis

We contribute to the study of the representativeness of social partners by employing a dissimilarity analysis. We argue that a representative social partner would ideally exhibit high affiliation rates and draw its membership in a balanced way across different dimensions of interest. For instance, in the case of EAs, these associations would be characterised as representative if their members are equally likely to be small and large firms, old and new firms, or more and less productive firms, in a manner consistent with the distribution of all firms in the country.

In contrast, if most members of an EA are similar (large firms, for instance) but different from not affiliated firms (which are mostly small firms, for example), then it may be difficult to argue that such EA would be representative. In other words, by having a membership base that over- or under-represents particular relevant dimensions of firms (such as firm size), the preferences and priorities of such EAs may not be in line with those of most other firms in the country.

It is important to note that, from a theoretical perspective, there is not necessarily a numerically negative relationship between affiliation rates and dissimilarity levels. Except for extreme cases of very high affiliation rates, such affiliation may be concentrated in particular groups of firms, thus leading to potentially high levels of dissimilarity. This perspective is supported by the limited empirical evidence available, which indicates that affiliated firms tend to be larger, for instance (OECD 2019).

The potential imbalances above can be of critical relevance from a policy perspective. High levels of dissimilarity - even in a context of moderately high affiliation rates - may lead to biased contributions from such social partners with respect to the shaping of labour market institutions. For instance, the views and preferences of large firms may take a much larger weight in decision making in terms of employment law, collective bargaining, minimum wages,

vocational training or any other dimension in which social partners play a role, potentially leading to obstacles for the growth of small firms.

Given the context above, we propose that social partners be considered in terms of both their affiliation rates, as already done in multiple contexts (Eurofound 2016), but also in terms of their dissimilarity levels. The latter can be measured through the dissimilarity or segregation index (Duncan & Duncan 1955). Previous applications include studies of segregation of ethnic minorities across neighbourhoods, of migrants across occupations, of students across classes and many others (Glitz 2014, Hellerstein & Neumark 2008, Andrews et al. 2017, Firmino et al. 2020). This index computes the extent to which individuals of one type are distributed in the same way (in terms of the shares of all individuals of the same type) across multiple units of interest when compared to individuals of a different type.[3] In the main part of this paper, we consider the distributions of affiliated firms (and their workers) across cells defined by firm size/industry groups, as in the following equation:

$$D = \frac{1}{2} \sum_{j=1}^{J} \left| \frac{a_j}{a} - \frac{na_j}{na} \right| \tag{1}$$

The definition of the variables and subscripts is: j denotes the labour market cell (a specific combination of industry and firm size categories in a country) and J is the total number of cells; a_j is the number of workers in (EA- or TU-) affiliated firms in cell j; a is the total number of workers in (EA- or TU-) affiliated firms; na_j is the number of workers in not affiliated firms in cell j; and, finally, na is the total number of workers in not affiliated firms.

This expression therefore adds, across all (firm size/industry) cells, the absolute value of the difference between the proportion of affiliated workers in a cell (with respect to all affiliated workers) and the proportion of non-affiliated workers in the same cell (with respect to all non-affiliated workers). The resulting dissimilarity index, for each country, D, will then range between 1 (maximum dissimilarity) and 0 (no dissimilarity). The latter case will arise when the percentage of affiliated workers in each cell (with respect to the total number of affiliated workers) is exactly equal to the percentage of non-affiliated workers (with respect to the total number of non-affiliated workers) in that same cell. Note that this extreme case and less extreme versions can arise regardless of the affiliation rate, as we discussed above.

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[3]See Carrington & Troske (1997), Hutchens (2001) and Hutchens (2004) for additional analyses of this and other related indices and their properties. Note that this index is monotonically increasing in the deviations between the two distributions.

Note also that these dissimilarity indices can be interpreted as the percentage of (affiliated) firms (or employment across firms, in employment-weighted measures) that would need to be 'relocated' to different cells to ensure full representativeness with respect to their non-affiliated counterparts.

There are four additional points that we wish to discuss. The first concerns the definition of cells adopted in a dissimilarity analysis. While this definition is obvious in a study of segregation in neighbourhoods, occupations or classes, different approaches can be followed in the case of more complex and multi-dimensional entities such as labour markets. As indicated above for concreteness, our empirical application is focused on the firm size and industry dimensions, considering three categories in the former case and six in the latter, resulting in 18 different cells per country. While these parameters are largely dictated by data availability, we believe they capture key, if not the most important, dimensions in our type of analysis. The gap in preferences between large and small firms can be acute, leading to relevant questions about representativeness. Similarly, different industries may have different preferences regarding labour market institutions, depending on how open they are to international trade, how reliant on skilled or unskilled labour, and the different business cycle that they may be facing at each point in time. Such heterogeneity warrants the inclusion of the industry dimension in the criteria behind the definition of the cells.

The second point concerns the measurement of the a or na variables in terms of the number of firms or in terms of the workers of these firms. We believe it is preferable to consider the latter approach as it will weight more accurately the potentially different distributions of the two types of units (affiliated and non-affiliated firms). If larger firms tend to be both affiliated and located in particular cells, the consideration of the number of workers will take this into account in the computation of the dissimilarity index. Note that, even if such adjustment were not conducted, the index is still based on the consideration of the percentage of each type of unit in the total number of units (not in the number of units in the particular cell). This means that the choice between number of firms or number of workers of these firms is not likely to lead to large differences in the results in any case.

Our third remark concerns the use of a sample of firms and not population data. This limitation will inevitably introduce sampling error in our analysis: a part of the differences in group shares in a given cell will be driven by lack of precision in our estimates of the total

number of units of each type and, more importantly, by the number of units of each type in each cell. These constraints thus create an upward bias in our measurement of dissimilarity. In our application, we follow the methodology of Allen et al. (2015), described in Appendix A, to correct for this. In a nutshell, this methodology removes contributions to the overall dissimilarity from cells where the cell-specific dissimilarity value is below a given threshold, namely that related to the standard deviation of the individual contributions across all cells.

Finally, our fourth and final point is to highlight the potential large number and diversity of both EAs and trade unions in each country. Unfortunately our data does not include information on these elements as we only know whether a firm is affiliated (or not) with any EA and not in which specific EA the firm may be affiliated. This data restriction forces us to consider employers' and workers' social partners in each country from an aggregate perspective, combining multiple actors in a single employers' entity and a single workers' entity, respectively. However, in many countries considered, different EAs are affiliated to the same (and single) employers' confederation, in which case our aggregate analysis will be fully adequate.

3 Data and descriptive statistics

3.1 European Data

The data source in our comparative analysis of European countries is the European Company Survey (ECS). This survey is collected by the European Foundation for the Improvement of Living and Working Conditions (Eurofound), across over 30 countries and several waves. In our study, we use the year 2013.

The ECS includes an Employee Representative (ER) questionnaire, with information regarding workers and labour organisations, and the Management (MM) questionnaire, about a wide variety of firm characteristics, employer representation and collective bargaining. Only MM units with some form of employee representation are eligible to answer the ER part. In our study, we have used information exclusively from the MM units. We also considered only private sector companies as the nature of social dialogue in the public sector tends to be distinctive.

The MM file of the 2013 ECS wave data originally contains detailed information on 27,019 firms or establishments across 32 countries. After deleting public companies and removing

a small number of observations with missing information in key variables, our 2013 sample covers a total of 24,389 companies. Note that firms surveyed have at least ten employees, which may bias upward our affiliation estimates.

We classify firms as members of employers' organisations using question 30 (variable AEM-PORG), which asks 'Is your company a member of any employers' organisation which participates in collective bargaining?'. We find that 35.6% of the firms respond affirmatively, a percentage that ranges between 83.5% in Sweden and 4.4% in Turkey (and, in the European Union, 9.2% in Romenia).[4]

Moreover, we classify firms as covered by trade unions or works councils (variables ER-TYPE A and ER-TYPE B) - 'Trade union representation/shop steward/Works Council: Official employee representation currently exist in your establishment?'. We find that 39.1% of the firms respond affirmatively, a percentage that ranges between 95.9% in Iceland (and, in the European Union, 78.6% in Denmark) and 6.8% in Latvia. Of course, these figures are not directly comparable to union density rates for a number of reasons. For instance, not all workers in a firm with trade union representation are necessarily unionised.[5]

As indicated in Section 2, we consider 18 units of potential segregation, defined from the three firm size categories (10-49, 50-249, and 250+ employees) and the six industries (Industry, Construction, Commerce and hospitality, Transport and communication, Financial services and real estate, and Other services) available in the data. Our dissimilarity indices concern the extent to which the shares of affiliated firms across these 18 cells mirror the equivalent shares of non-affiliated firms across the same cells. This measure is therefore not necessarily sensitive to differences in overall affiliation rates as dissimilarity can be high or low both for high or low affiliation.[6]

When computing the total size of each (affiliated and non-affiliated) group, we consider each firm in terms of its number of workers. As this size information is available in the ECS only in terms of the three firm size categories above, we consider an intermediate point of each category, based on its lower bound plus one third of the difference with respect to the upper bound: 23 in the case of the 10-50 range and 116 in the case of 50-250 range. In the case of

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[4]3.1% of the firms answer 'Don't know' or do not answer and are classified as non-members.

[5]We find a correlation of 55.02% between our measure and that of the OECD.

[6]Consider the following example of a cell that corresponds to 10% of all affiliated firms. If that cell corresponds to 3% of the non-affiliated firms, the dissimilarity index contribution from such cell will be 7%, the absolute value of 10%-3%. This example is equally consistent with a case in which 80% of all firms are affiliated or a case in which only 10% of all firms are affiliated.

the 250+ range, we consider the value of 333.[7] Moreover, we also take into account the ECS sample weight of each firm, adjusted for the fact that our sample considers only firms from the private sector.

Table 1 presents the descriptive statistics of the main variables at the firm level. We find that 35.6% of firms on average are members of an employers' organisation which participates in collective bargaining and that 39.2% of firms have a trade union or work council acting as employee representation. Regarding the size of the companies, most of the firms (52.2%) are small (10-49 employees), 31.8% have between 50 and 249 employees and 16% have more then 250 employees. The average number of workers across the firms, using our estimate of the average number of employees per size category, is 102 employees. Regarding the sector composition of these firms, most are in industry (35.4%), commerce and hospitality (25.8%), and other services (18.1%). There is only a small percentage in construction (8%), transport and communication (7.6%) and financial services and real estate (5%).[8]

3.2 Portugal Data

We also study in greater detail the case of Portugal, given the availability of more detailed data, including the population of all private-sector firms in the country and information on EA affiliation and trade union membership for each firm. These data are made available in Personnel Records ('Quadros de Pessoal', QP), a compulsory survey of all firms in Portugal with at least one employee, conducted by the Ministry of Employment.[9]

In order to obtain results from a period as comparable as possible to that of the ECS, which concerns the year 2013, we focus on EA data for 2009, the latest year available, and trade union data for 2010, the only year available.[10] We then construct the 18 cells underpinning the dissimilarity index using the same three firm size categories (10-49, 50-249, 250+) and

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[7]Given the typically log normal distribution of firm size, we believe that the one third factor is more appropriate than adopting the range mean. In the case of third group, we added one third of the bottom threshold.

[8]In Table B1, we present the country statistics for the same variables. There are countries with a large presence of firms in the sample (Germany, Spain, France, Italy, Poland, UK and Turkey, with more than 1,000 firms each) while other countries (Montenegro, Malta, Croatia, Iceland, North Macedonia, Slovenia, Slovakia, Luxembourg, Latvia, Cyprus, Croatia and Ireland) have fewer than 500 firms. Despite these differences in sample size, the sectoral and size composition by country is relatively similar to the average of the full data set for most countries.

[9]This census also includes a number of additional variables about firms and their workers but which are not exploited here, given our focus on social partner representativeness.

[10]See ? and Martins (2020) for descriptions of trade unions and EAs in Portugal, respectively, and earlier analyses of these variables. See Hijzen et al. (2019) for a comparison of collective bargaining in Portugal and the Netherlands.

the same six industries as in the main ECS analysis.

However, we also exploit the comprehensive nature of our data set for Portugal by constructing more detailed cells. These correspond to the same three firm size categories but a much larger number of (up to 100) two-digit industries, and seven different regions. This more detailed approach leads to a total of 1,101 cells. This approach is also facilitated by the population nature of the data, with a total of 3.11 million employees and 349,816 firms - resulting in an average of over 317 firms per cell. In this context, we do not follow the methodology of Allen et al. (2015) in the analysis of Portugal's data.

4   Results: Europe

The main results of our study are presented in Table 2. For each one of the 32 countries considered in the European Company Survey of 2013, Table 2 lists the affiliation rate and dissimilarity index of EAs (first two columns) and of trade unions (last two columns). As indicated above, the affiliation rates follow from a simple analysis of the percentage of workers that are employed in firms that are affiliated in EAs (or the percentage of workers that are employed in firms that have trade union or worker council presence). In contrast, the dissimilarity indices follow from the application of the Allen et al. (2015) procedure in computing EA and trade union dissimilarity levels in each country, according to equation 1.

Focusing first on the case of EAs, we find that, when adjusting for firm size and sample weights, affiliation rates range between 8.3% in Turkey (and, in the European Union, 13% in Poland) and 93.3% in Sweden. In the larger EU countries of Germany, France, Italy and the UK, these rates are 46.9%, 55.9%, 62.4% and 22.1%, respectively. Dissimilarity indices display a contrasting picture, in that they are typically smaller and less dispersed: they range between 16.1% in Poland and 58% in Iceland (and, in the European Union, 55% in Malta). Moreover, in the larger EU countries of Germany, France, Italy and the UK, these indices are 26%, 19%, 30.6% and 35%, respectively. On average, affiliation rates across EU (non-EU) countries are 37.1% (21.1%), while dissimilarity indices are 41.5% (39.4%).

What relationship do these two dimensions of the representativeness of EAs exhibit? Figure 1 presents the two statistics for each country, indicating a mild *positive* relationship between EA affiliation rates and dissimilarity indices (correlation of 0.226). This result indicates that, contrary to what may have been assumed in the past, higher affiliation rates

do not necessarily imply lower dissimilarity indices. In other words, EAs that represent a larger percentage of firms (and, indirectly, account for a larger percentage of workers) do not necessarily tend to be more representative from a dissimilarity perspective. According to our results, the membership of such EAs tends to be concentrated in particular firm size/industry combinations and not spread equally across these dimensions. While such larger EAs are more representative from the perspective of their (relative) size, they are less representative in the sense that their membership profile is different from the profile of not affiliated firms in their country.

Specific country comparisons may be illustrative of the results described here. For instance, while the Southern European countries of France, Spain, Portugal and Greece have similar EA affiliation rates of around 50%, their dissimilarity indices are very different. France and Spain exhibit low dissimilarity levels (of about 20%), while Portugal and Greece have much higher dissimilarity levels (33% and 45%, respectively). Similarly, countries with close dissimilarity indices may have very different affiliation rates: Estonia, Bulgaria, Belgium and Austria all have dissimilarity indices of around 40% but the first two countries have affiliation rates of only 20% while the latter two have affiliation rates of around 80%.

One may also argue that countries that simultaneously exhibit high affiliation rates and low dissimilarity indices will have the most representative social partners. In the case of EAs, our analysis suggest that this group may include countries such as Luxembourg, Netherlands, and Italy, all with affiliation rates of 60% or above and dissimilarity indices of close to 30% or less. In contrast, some countries exhibit simultaneously low affiliation rates and high dissimilarity, namely Latvia and Slovakia, with dissimilarity indices above 50% and affiliation rates below 40%.

We now turn our attention to the case of trade unions, notwithstanding the caveats above regarding the nature of the information available in this respect in the ECS. Considering again Table 2, we find that, when adjusting for firm size (and sample weights), trade union affiliation rates range between 16.6% in Latvia and 97.9% in Iceland (and, in the European Union, 91% in Denmark). In the larger EU countries of Germany, France, Italy and the UK, these rates are 63%, 84.9%, 62.9% and 29.7%, respectively.[11] Again, dissimilarity indices display a contrasting picture in the case of trade union membership: these indices range

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[11]The very large rate in the case of France is not consistent with trade union density statistics from other sources. This gap reflects the fact that we consider all workers in unionised firms to be unionised, which is clearly not the case in France (and possibly other countries too).

between 16% in Latvia and 98% in Iceland (91% in Denmark). Moreover, in the larger EU countries of Germany, France, Italy and the UK, these indices are 63%, 85%, 63% and 29%, respectively. On average, affiliation rates across EU (non-EU) countries are 38.4% (45.4%), while dissimilarity indices are 53% (34.5%).

Figure 2 presents the two variables above graphically, similarly to the analysis of Figure 1 but now considering the case of trade unions. Again we do not find any evidence of a negative relationship between affiliation rates and dissimilarity indices - indeed, the simple correlation is positive, at 0.077. In other words, the trade unions (and worker councils) of countries where they represent a larger share of workers are generally not the least dissimilar trade unions. High affiliation rates are as consistent with low or with high dissimilarity indices (take the cases of Spain, Netherlands and Sweden). Similarly, low affiliation rates are again as consistent with low or high dissimilarity indices (Greece, Romania or the UK). Note that this pattern also applies when considering trade union density data from the OECD instead of affiliation rates (see Figure B1) and therefore is not likely to be driven exclusively by the nature of the ECS data.

4.1 Additional analysis

In this subsection, we conduct additional analyses to investigate further the potential role of different methodological choices in our findings. In the first robustness check, we disregard the correction of the Allen et al. (2015) methodology and consider all individual (firm-size/industry) cells when computing a country's dissimilarity index. In the second analysis, we adopt an entirely different approach and disregard the (imputed) number of workers of affiliated and non-affiliated firms. In other words, in this second approach, we treat all firms alike, regardless of their size, except for the purposes of assigning them to different firm-size categories. In this second approach, we also compute affiliation rates disregarding firm-size, that is, considering only the percentages of firms that are affiliated or not (in contrast to our benchmark results, based on the percentages of workers that are in firms that are affiliated or not).

The left panel of Table B2 presents both the EAs and trade unions affiliation rates and dissimilarity indices without the Allen et al. (2015) correction, while the right panel presents the same results when not considering the (imputed) employment of the firm. In the first

case, we find that both the trade unions and the EAs dissimilarity indices are not affected in most cases. Moreover, their correlation remains positive and large, at 0.347 (no weights) and 0.502 (with sample weights).

We also find - right panel of Table B2 - that considering only the number of firms and not the number of workers per firm does not affect considerably the EA and trade union affiliation rates. However, we find that the correlation between EAs affiliation rates and dissimilarity indices becomes negative (-0.234), while the correlation between trade unions affiliation and dissimilarity is virtually zero (0.009). The first case is the only one across our multiple specifications and samples in which we find a negative relationship between affiliation and dissimilarity but even in this case the underlying correlation is low.

Two additional analysis concern the correlations between our two indicators (affiliation rates and dissimilarity indices, using our benchmark specification). Figure B2 considers the case of affiliation rates, which indicates a strong positive relationship between EAs and trade unions densities. Figure B3 conducts a similar analysis for dissimilarity indices and again finds evidence of a positive correlation between the employers and workers dimensions: countries with higher levels of dissimilarity in EAs tend to be countries with higher levels of dissimilarity in trade unions. This result underlines the contrast with our main finding of a generally weak negative correlation between affiliation and dissimilarity measures.[12]

A final additional analysis is based on the consideration of an alternative dissimilarity measure, in this case based on the Gini index. The results are presented in Figures B4 and B5 (EAs and trade unions, respectively) and again indicate a positive relationship between this different measure of dissimilarity and the EA and trade union density rates.

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[12]In an appendix, we also examine how dissimilarity relates to macroeconomic outcomes, namely the unemployment rate and average wages. This analysis may offer additional insights on the potential effects of the segregation between affiliated and non-affiliated firms. For instance, high dissimilarity levels may lead to collective agreements not in line with productivity, resulting in higher wages and unemployment. Given the limitations of our data, namely its aggregated nature, we present scatterplots between affiliation indices and these two macroeconomic outcomes, using OECD 2013 data. Figure B7 (B8) presents EAs (TUs) dissimilarity indices and the unemployment rate. Similarly, Figure B9 (B10) presents EAs (TUs) dissimilarity indices and the average annual wage. In almost all cases, these variables exhibit very low correlations. On the other hand, Figure B11 (B12) present EAs affiliation rates and unemployment (wages), indicating negative (positive) correlations. While merely suggestive, these analysis may point towards a more important role for affiliation rates in explaining macroeconomic outcomes, despite the potential complementary relevance of dissimilarity indices. Finally, we also examine the relationship between affiliation and dissimilarity of both EA affiliation and TU membership. In other words, we conduct this analysis jointly, by comparing firms in which both affiliations apply against firms in which at least one of these two affiliations does not apply. We find again - Figure B13 - the same pattern indicating a positive correlation between affiliation and dissimilarity.

5 Results: Portugal

We now turn our attention to the case of Portugal, for which we can draw on population data covering all firms and all their employees. As indicated above, our data also includes information on the employer association in which each firm is registered in and the number of unionised employees of each firm. This is the only data set that we know of that provides this extensive range of information. In this section, we exploit this more comprehensive data to provide evidence about the robustness of our ECS results above and to conduct a number of extensions.

In our first analyses, we compute the dissimilarity index for Portugal, using all firms in the country, weighting for employment in each firm, and considering the same firm size/industry cells as in our ECS statistics. We also extend our analysis into considering more detailed cells, based on two-digit industries and seven regions, in addition to the same three firm-size categories (instead of the six industries and three firm-size categories as before). The total number of cells thus increases considerably, from 18 to 1,101. This allows for a much more detailed comparison of the distribution of affiliated and non-affiliated firms (and their workers) across multiple dimensions of firm characteristics (industry, region, and firm size). At the same time, our coverage of nearly 350,000 firms and over 3.1 million employees ensures that the resulting cells are adequately populated.

In this context, the case of EAs, we obtain a dissimilarity index of 25.7% when considering the same cells as in our analysis of European countries. When we consider the more detailed set of cells (industry, region, and firm size), we find a dissimilarity index of 36.1%. If we compare these two figures with their counterparts of Figure 2, again for Portugal, we find that they are similar. The EA dissimilarity index for Portugal using the ECS data is 33.2%, which lies between the 25.7% and 36.1% figures obtained with the richer QP data. Despite our consideration of only one country, this comparison suggests that the measure of dissimilarity obtained from the ECS analysis is a good proxy for the true measure of dissimilarity obtained from population data, at least in the case of EAs.

We now repeat the same analysis of the Portuguese data for the case of trade unions. Unlike in our ECS analysis, in the case of the QP data set for Portugal, we have information on how many workers are affiliated in trade unions in each firm. Therefore do not assume as we did before that all employees in a firm with union (or worker councils) representation

are unionised. On the other hand, the QP data does not provide information about works councils, perhaps because their number is thought to be small (fewer than 300 in total). In this context, when considering the same firm size/industry cells as in our ECS analysis above, we obtain a dissimilarity index of 49.3%. When using the more detailed definition of cells (considering up to 100 industries and seven regions on top of the three firm-size categories), we obtain a larger dissimilarity index, at 57.6%. If again we compare these two figures with their counterparts from Figure 2, we find that they are similar, despite the caveat above regarding the additional difference in measurement. The trade union dissimilarity index for Portugal using the ECS data is 48.4%, which is very close to the 49.3% obtained with the same number of cells in the QP data, while lower than the 57.6% obtained with the more comprehensive set of cells.

Another result that follows from these comparisons is that an analysis based on a larger number of cells (following from a more detailed industry classification and the consideration of the regional dimension) leads to higher levels of dissimilarity. The index increases from 25.7% to 36.1% in the case of EAs and from 48.4% to 57.6% in the case of trade unions. Presumably the consideration of additional dimensions, such as firm age and or firm productivity, leads to even higher dissimilarity levels. A question that follows from this finding - which we leave for future research - concerns the optimal set of firm dimensions to better understand the dissimilarity of social partners.

5.1 Analysis across different EAs

Our analyses so far, both using the ECS and QP data sets, have focused on the dichotomy between affiliated and not affiliated firms (and unionised and non unionised firms). In other words, we studied the representativeness of EAs as a single group. However, both affiliation rates and dissimilarity indices can potentially vary considerably across EAs within the same country. In this subsection, we address this question by exploiting in more detail the information available in QP indicating the specific EA membership of each firm. We then run the same affiliation and dissimilarity as above but considering each EAs individually.[13]

One intermediate, practical step in this analysis concerns the assignment of non-affiliated firms to the relevant (potential) EA for the purpose of computing affiliation rates. This follows

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[13]Our analysis considers exclusively the case of EAs, as we do not have information on the specific trade union in which each worker is affiliated.

from the fact that individual (potential) EA information is not available in the case of firms that are not affiliated. Note that, given the diversity of configurations of EAs - which can cover different combinations of industries defined at different levels of detail and present in different regions -, the assignment step above is not necessarily straightforward.

We address this challenge by developing a data-driven approach that exploits the richness of the data set and Portugal's institutional structure. The latter concerns the widespread collective bargaining extensions in Portugal (Hijzen & Martins 2020, Martins 2021). This institutional feature is useful here as it implies that the employees of non-affiliated firms will be subject to the collective agreements bargained by the key EA in the industry/region of their firm. The former, data dimension follows from the fact that each firm indicates, in the QP data, the code of the collective agreement that the firm is applying for each one of its employees.

Specifically, the steps we follow are: First, we compute the modal collective agreement of each firm by analysing the collective agreement applicable to each one of its employees. Second, we compute the modal EA of each modal collective agreement, again by considering all individual employees and their firms. Here we use both our data on the EA of each firm (if a firm is affiliated) and the collective agreement of each worker of each firm. Finally, we define the scope of each EA as the range of firms which have the same modal (actual or indirect) EA, as indicated from its modal collective agreement. In other words, we make use of widespread extensions to establish the full domain of collective agreements and their subscribing EAs.[14]

Having a data set indicating which firms are or are not affiliated in each EA, we consider the firm size categories as above (10-49, 50-249 and 250+) - but not the industry dimension - to compute dissimilarity indices by EA. We also compute affiliation rates. In both cases, we compute measures that weight or not each firm by its employment (to account for differences within each firm-size category).[15] We find a total of 121 EAs, with a mean of 364 affiliated firms and 7,737 employees. Moreover, we find affiliation rates of 24.8% (unweighted) and 41% (weighted) and dissimilarity indices of 11.8% (unweighted) and 22.2% (weighted).

Finally, we analyse the correlation between our two measures of representativeness by comparing across EAs. Figure 3 presents the graphical evidence and Tables B3 and B4 the

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[14]While it is relatively rare to have the same collective agreement subscribed by more than one EA in the same year, our empirical approach ensures that, in those cases, we focus our analysis on the larger EAs.

[15]We drop very small EAs, namely those that have fewer than ten affiliated firms or that have fewer than 100 employees in their affiliated firms.

detailed results for each EAs. Once again, as in our main ECS results, we find evidence of a *positive* correlation between affiliation rates and dissimilarity indices (correlation coefficient of 0.49). EAs that represent a larger percentage of all firms and their workforces in the relevant sector tend to be more dissimilar (that is, more concentrated in particular firm size categories). Of course, this is not always the case, as some EAs display high affiliation rates and low dissimilarity indices.[16]

5.2 Employers' associations characteristics, employment and wages

We are also interested in understanding the potential relevance of dissimilarity in influencing variables of general interest such as employment and wages. While these correlations proved weak in the case of country-country analysis (footnote 12), a within-country, cross-employer-association analysis based on the data for Portugal may prove more promising. In this case, common macroeconomic factors will apply, removing the noise that otherwise applies in a cross-country analysis. Our access to population data also allows us to measure rigorously the employment and wage levels of the workers covered (directly and indirectly) by each employer association, as well as their affiliation and dissimilarity rates.

Note that, so far, we have been largely agnostic as to the effects of dissimilarity on economic outcomes. Our focus has been above all on documenting empirical patterns and highlighting the relevance of the new measure that we propose in this paper. Indeed, an analysis of effects is difficult as dissimilarity can vary across sectors for multiple reasons, some of which may also have a direct effect on economic outcomes. Taking these limitations into account, we consider multiple variables in our analysis, namely the employment and wage levels and wage dispersion (standard deviations) in each sector, corresponding to each employer association. We consider both unconditional wages and wages conditional on the job categories of each collective agreement. The latter measure is obtained from the residuals of a regression on each worker's wages on the approximately 30,000 job levels (**?**) across the collective agreements in the country.

Our analysis is then based in regressing the log of each measure above (in which each

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[16]See Figure B6 for the same graphical analysis in the case of unweighted data. In this case, we find that dissimilarity indices are much more concentrated at low levels. However, even in this case, the correlation between the two variables remains positive, even if close to zero (0.09). The difference between the weighted and unweighted results points towards important differences in the distribution of affiliated and non-affiliated firms within each of the three firm-size categories considered and resonates with our findings in the ECS robustness subsection.

observation corresponds to a different employer association and its sector) on its affiliation and dissimilarity levels. Table 3 presents the results, which indicate a positive and statistically significant relationship of dissimilarity for virtually all dependent variables.[17] In other words, our results indicate that sectors whose employer associations are more dissimilar (affiliated and non-affiliated firms are distributed more differently) tend to be sectors where employment, salaries and salary inequality is higher.

We take these results as further support of the view that dissimilarity measures are relevant and complement the until now more standard representativeness measures based exclusively on affiliation rates. While we leave a fuller explanation for these results for further research, the result regarding wage dispersion appears consistent with the concept of dissimilarity itself. If there are larger differences between firm types (as captured by the dissimilarity index), then it is not surprising that wage dispersion is also higher.

6 Conclusions and discussion

Social partners (trade unions and EAs) shape labour institutions and socio-economics outcomes in many countries, despite declining density rates in some cases. For a number of reasons, such contributions of social partners, in the context of their social dialogue, at both national, sectoral and firm levels, are valued across different countries, in particular in Europe. These contributions are thus an important dimension of labour markets, economies and societies, which will be influenced by the characteristics of social partners - the subject of our research.

Specifically, in this paper, we study social partners' representativeness. We do so by measuring for the first time the *dissimilarity* between affiliated and non-affiliated firms (and their workers) across industry/firm-size cells and 32 European countries. We argue that the dissimilarity approach may offer evidence on representativeness that is complementary to the more common measurement based on affiliation rates. For instance, employers's associations may represent a relatively large number of firms but the latter may be of particular characteristics, namely mostly larger firms. This may induce bias in the nature of representation conducted by EAs, by disregarding the preferences of an important range of economic activity in the country (those of smaller firms, in this example).

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[17]The only exception is the case of log residual salary (column 4), perhaps because of the much smaller of observations due to negative figures.

Using the European Company Survey, we find that affiliation rates and dissimilarity indices correlate poorly across countries, particularly in the case of EAs. If anything, these correlations tend to be positive rather than negative. While some countries exhibit simultaneously high levels of affiliation and low levels of dissimilarity, many do not. In particular, for a specific level of affiliation, countries may exhibit different levels of dissimilarity. Moreover, we also find that these results hold (and are even stronger) when using more detailed, firm population data for Portugal, comparing across different EAs. This latter analysis also indicates that dissimilarity measures have explanatory power with respect to a number of relevant variables, namely wage levels and wage dispersion.

Why does affiliation and dissimilarity tend to correlate positively? While a detailed analysis of this question is outside the scope of this paper, we propose here two potential complementary explanations. The first is about service specialisation: for social partners to increase their membership, they may need greater specialization in the services provided to their constituents. For instance, worker training needs may vary considerably across firm sizes given these firms' different technological and productivity levels. In this context, very diverse social partners, e.g., EAs representing both small and large firms, may struggle to deliver effective services to their members given the different preferences of such diverse firms, leading to lower affiliation rates.

The second, related potential explanation we propose concerns the scope for coordination or even collusion amongst participating members. Again, very diverse social partners in terms of their constituents may find it more difficult to sustain such practices. However, once a social partner specialises in a specific subset of firms (or workers), coordination and collusion may become more stable and deliver greater benefits. Such benefits also represent a further incentive for similar firms to join the social partner, leading again to the positive correlations between affiliation and dissimilarity that we present here.

These explanations may also contribute to the debate regarding the dual (positive and negative) roles and views of trade unions (which can be extended to EAs), namely involving voice provision and rent-seeking. Specifically, the association between affiliation and dissimilarity may follow from service specialisation, improving voice provision, or from coordination and colluson, potentially involving a rent-seeking dimension. From a social perspective, the second component may be harmful. In any case, both components prompt a reconsideration

of the interpretation of affiliation rates with respect to representativeness.

Overall, our findings indicate that a good understanding of the representativeness of social partners requires information on both affiliation rates and dissimilarity indices - and not only the former, as has been standard practice. Social partners that represent a diverse range of firms of different characteristics may be better positioned to contribute more positively in the different economic and social dimensions in which they operate, including collective bargaining. In this context, policy makers should pay attention to the dissimilarity of social partners and not necessarily equate affiliation with representativeness. Future research may also investigate the possibly different roles of affiliation and dissimilarity in influencing socio-economic outcomes.

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Table 1: Descriptive statistics - firms

	Description	Obs.	Mean	Std.Dev.
Employers' association membership	Share of companies that respond they are member of any employers' organisation which participates in collective bargaining	24305	0.3558	0.4788
Trade unions' membership	Share of companies with a trade union (works council) acting as employee representation at the company.	24615	0.3921	0.4882
Dummy variables for the size	10-49 employees	24305	0.5215	0.4995
	50-249 employees	24305	0.3181	0.4657
	More than 250 employees	24305	0.1604	0.3670
Employment	Approximated number of employees by assigning a mid-point to the size of the firm	24305	102.3	109.0
Dummy variables for the sector	Industry	24305	0.3542	0.4783
	Construction	24305	0.0805	0.2720
	Commerce and hospitality	24305	0.2579	0.4375
	Transport and communication	24305	0.0764	0.2656
	Financial services and real state	24305	0.0505	0.2189
	Other services	24305	0.1806	0.3847

Notes: Source: own elaboration using ECS 2013.

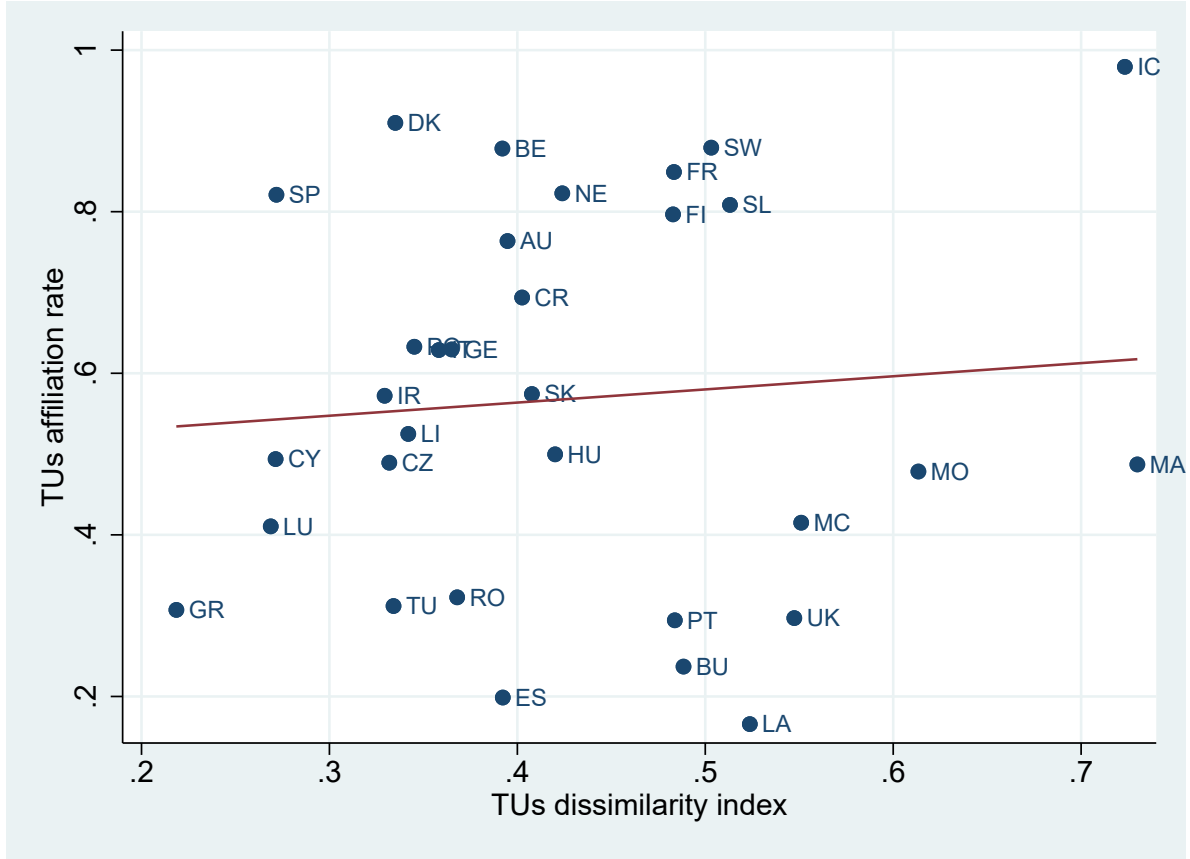Figure 1: Employers' associations dissimilarity index and affiliation rates across countries
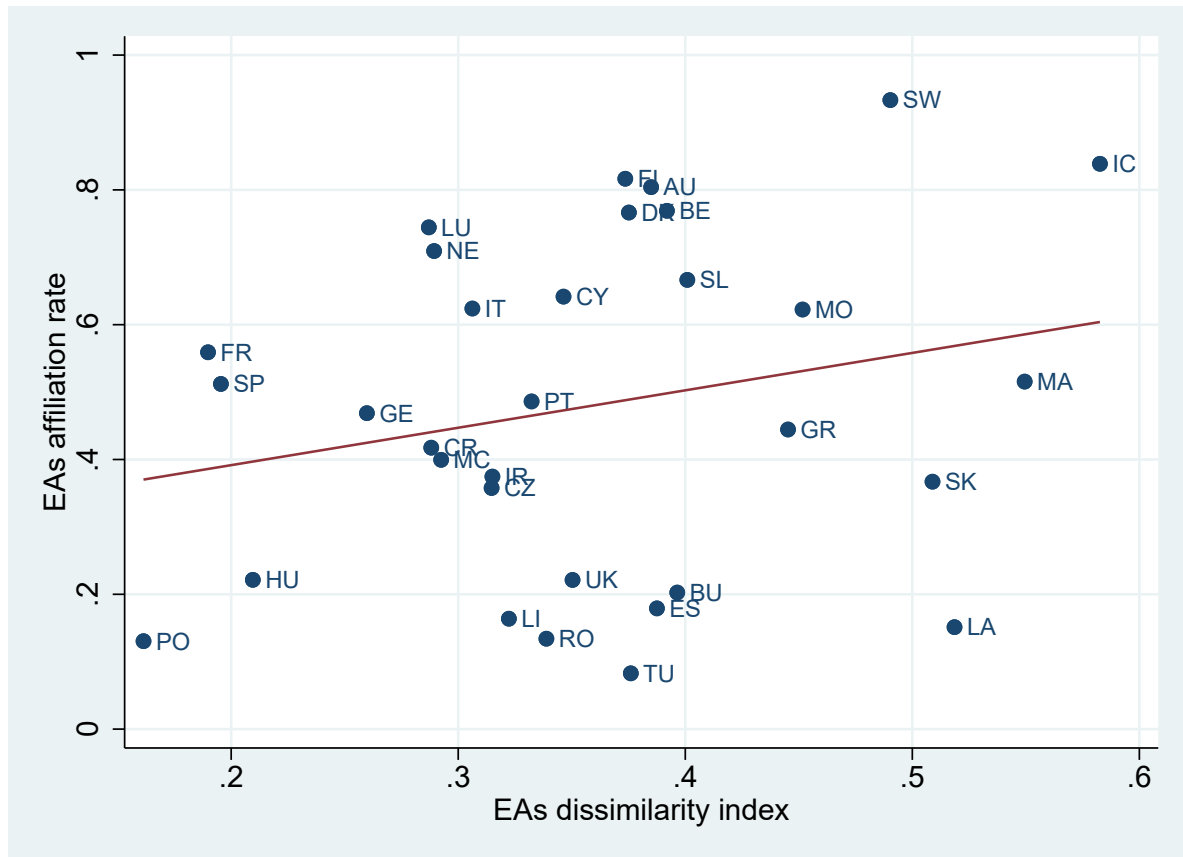
Notes: Source: Authors' analysis based on the European Company Survey 2013. Fitted line in red.

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Table 2: Employers' associations (EAs) and trade unions' (TUs) affiliation rates and dissimilarity indices across countries

Country	EAs affiliation rate	EAs dissimilarity index	TUs affiliation rate	TUs dissimilarity index
Belgium	76.9%	39.2%	87.8%	39.2%
Bulgaria	20.3%	39.7%	23.7%	48.8%
Czech Republic	35.8%	31.5%	48.9%	33.2%
Denmark	76.6%	37.5%	91.0%	33.5%
Germany	46.9%	26.0%	63.0%	36.5%
Estonia	17.9%	38.8%	19.9%	39.2%
Ireland	37.5%	31.5%	57.2%	32.9%
Greece	44.5%	44.5%	30.7%	21.9%
Spain	51.2%	19.6%	82.1%	27.2%
France	55.9%	19.0%	84.9%	48.3%
Croatia	41.8%	28.8%	69.4%	40.3%
Italy	62.4%	30.6%	62.9%	35.8%
Cyprus	64.2%	34.6%	49.4%	27.1%
Latvia	15.1%	51.9%	16.6%	52.4%
Lithuania	16.4%	32.2%	52.5%	34.2%
Luxembourg	74.4%	28.7%	41.1%	26.9%
Hungary	22.1%	21.0%	50.0%	42.0%
Malta	51.6%	55.0%	48.7%	73.0%
Netherlands	70.9%	28.9%	82.3%	42.4%
Austria	80.4%	38.5%	76.4%	39.5%
Poland	13.0%	16.1%	63.3%	34.5%
Portugal	48.6%	33.2%	29.4%	48.4%
Romania	13.4%	33.9%	32.3%	36.8%
Slovenia	66.7%	40.1%	80.8%	51.3%
Slovakia	36.7%	50.9%	57.4%	40.8%
Finland	81.7%	37.4%	79.7%	48.3%
Sweden	93.3%	49.0%	87.9%	50.3%
United Kingdom	22.1%	35.0%	29.7%	54.7%
EU countries	37.1%	41.5%	38.4%	53.0%
Iceland	83.9%	58.3%	97.9%	72.3%
Montenegro	62.3%	45.2%	47.8%	61.3%
North Macedonia	40.0%	29.3%	41.5%	55.1%
Turkey	8.3%	37.6%	31.2%	33.4%
Non-EU countries	21.1%	39.4%	45.4%	34.5%

Notes: Source: own elaboration using ECS 2013. EAs affiliation rate is the share of companies that respond 'Yes' to the question AEMPORG [Is your company a member of any employers' organisation which participates in collective bargaining?]. TUs affiliation is the share of firms that respond 'Yes' to the question ERTYPE(A) or ERTYPE(B) [If there is a trade union (works council) from the following types of employee representation that exist at the company level that also represent the employees working]. Both tables use ECS 2013 sample weights and employment of the firm. Employment was approximated using the [Establishment size in three categories: 10-49, 50-249, more than 250 employees] variable by assigning a mid-point of 23, 116 and 333 employees, respectively.

Figure 2: Trade unions' dissimilarity index and affiliation rates across countries
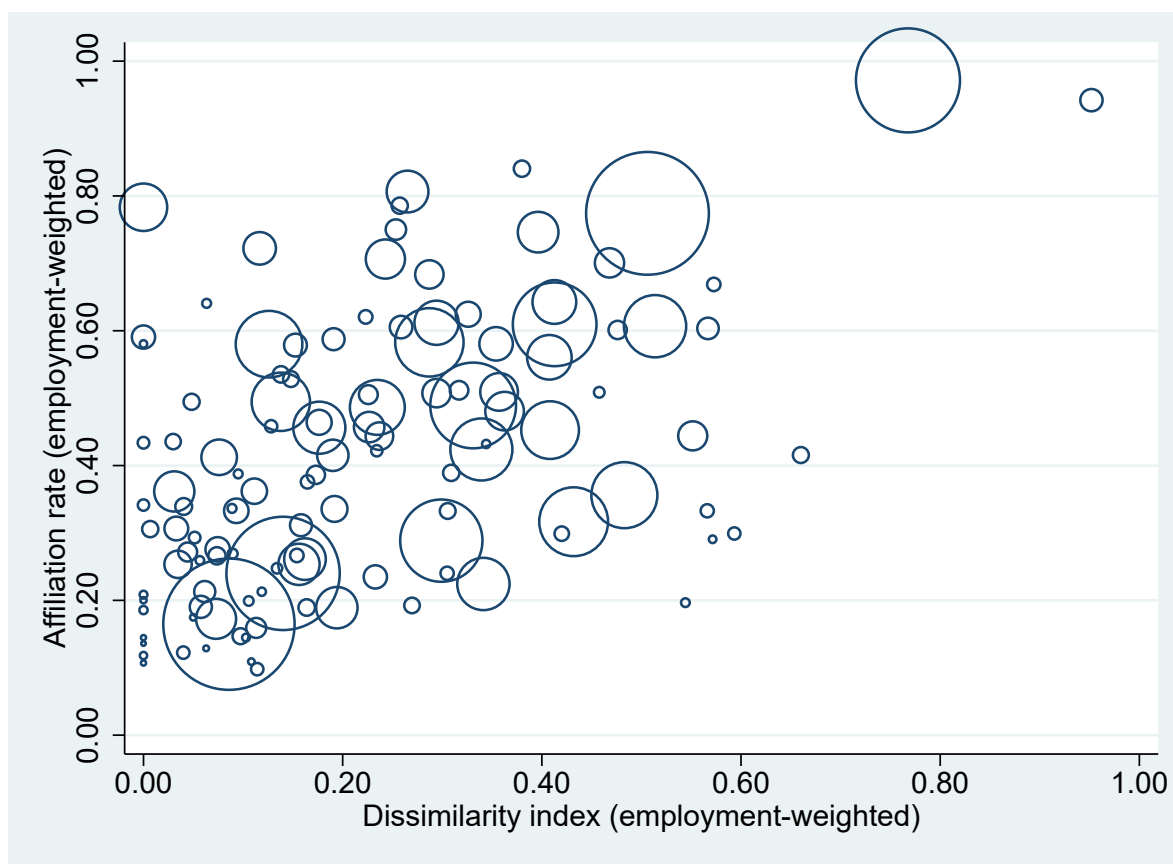

Notes: Source: Authors' analysis based on the European Company Survey 2013. Fitted line in red.

Table 3: Partial correlations of affiliation and dissimilarity rates and different employment and wage variables

	Log employment (1)	Log base salary (2)	Log total salary (3)	Log residual salary (4)	Base salary dispersion (5)	Residual salary dispersion (6)
Affiliation	-.092	.296	.403	.065	-465.381	-501.361
	(.711)	(.173)*	(.176)**	(.971)	(528.413)	(471.796)
Dissimilarity	1.340	.493	.526	-.774	1253.722	1053.732
	(.761)*	(.185)***	(.188)***	(1.123)	(565.269)**	(504.703)**
Constant	8.571	6.279	6.386	3.759	592.758	547.429
	(.284)***	(.069)***	(.070)***	(.477)***	(210.921)***	(188.322)***
Obs.	121	121	121	46	121	121
R^2	.031	.14	.178	.013	.04	.036

Notes: Affiliation rate and dissimilarity index measures are employment-weighted. Own calculations based on the 'Quadros de Pessoal' data set. Significance levels: * 0.10, ** 0.05, *** 0.01.

Figure 3: Employers' associations dissimilarity index and affiliation rates in Portugal

A   Appendix: The Allen et al. (2015) dissimilarity correction

The dissimilarity index can be influenced by sampling issues, leading to upward biases. Allen et al. (2015) proposed a correction in which the dissimilarity index is redefined as:

$$D_{bc} = \frac{1}{2} \sum_{j=1}^{J} \hat{\sigma}_j n(\hat{\theta}_j) \tag{2}$$

In the context of our research question, $\hat{\sigma}_j$ is equal to:

$$\hat{\sigma}_j = \sqrt{\frac{\hat{p}_{jkl}^1 (1 - \hat{p}_{jkl}^1)}{total_j^1} - \frac{\hat{p}_{jkl}^0 (1 - \hat{p}_{jkl}^0)}{total_j^0}}, \tag{3}$$

where j is the country, k is the industry and l is the size of the firm. This follows from our definition of each cell as a combination of the country, industry and size of each firm. In this way, $\hat{p}_{jkl}^1$ is the number of workers of affiliated firms per cell and $\hat{p}_{jkl}^0$ is the number of workers of non-affiliated firms per cell. $total_j^1$ is the number of workers of affiliated firms by country and $total_j^0$ is the number of workers of non-affiliated firms by country. Then, $\frac{\hat{p}_{jkl}^1 (1 - \hat{p}_{jkl}^1)}{total_j^1}$ might be interpreted as the percentage in each (industry/size/country) cell of workers in affiliated firms with respect to the workers in the total number of affiliated firms. Furthermore, we can define a measure of dispersion specific to each country, $\hat{\theta}_j$, which is defined as follows:

$$\hat{\theta}_j = \frac{|\hat{p}_{jkl}^1 - \hat{p}_{jkl}^0|}{\hat{\sigma}_j}, \tag{4}$$

in which $n(\hat{\theta}_j)$ is:

$$n(\hat{\theta}_j) = \begin{cases} 0, & if_j \leq 1 \\ \hat{\theta}_j, & if_j > 1. \end{cases} \tag{5}$$

If $\hat{\theta}_j = 0$, then $n(\hat{\theta}_j)$ can be interpreted as means of the cases in which the difference between affiliation/not affiliation probabilities in the cell is below standard deviation across all cells, which are reset to zero, whereas in the other case the difference between affiliation and non-affiliation is above the cut-off.

B   Appendix: Supplementary Figures and Tables

Table B1: Descriptive statistics - countries

Country	Number of companies	Size dummies			Sector dummies					
		10-49 employees	50-249 employees	More than 250 employees	Industry	Construction	Commerce and hospitality	Transport and communication	Financial services and real state	Other services
Belgium	887	0.49	0.33	0.19	0.35	0.06	0.21	0.10	0.06	0.23
Bulgaria	467	0.50	0.33	0.16	0.39	0.13	0.27	0.06	0.02	0.13
Czech Rep.	876	0.48	0.31	0.21	0.46	0.07	0.22	0.08	0.04	0.13
Denmark	863	0.46	0.40	0.14	0.28	0.06	0.30	0.06	0.08	0.22
Germany	1338	0.54	0.25	0.22	0.44	0.07	0.21	0.07	0.04	0.17
Estonia	470	0.53	0.37	0.11	0.37	0.08	0.27	0.10	0.04	0.14
Ireland	449	0.53	0.32	0.16	0.24	0.04	0.39	0.07	0.04	0.22
Greece	973	0.65	0.30	0.05	0.32	0.04	0.45	0.08	0.02	0.09
Spain	1365	0.47	0.32	0.21	0.30	0.07	0.22	0.08	0.04	0.29
France	1362	0.54	0.30	0.16	0.27	0.10	0.29	0.08	0.05	0.20
Croatia	380	0.56	0.27	0.17	0.33	0.16	0.29	0.05	0.06	0.11
Italy	1401	0.58	0.26	0.15	0.44	0.09	0.20	0.08	0.03	0.16
Cyprus	439	0.67	0.30	0.03	0.18	0.09	0.41	0.07	0.07	0.19
Latvia	438	0.53	0.32	0.16	0.26	0.11	0.33	0.10	0.06	0.14
Lithuania	408	0.53	0.33	0.14	0.32	0.13	0.28	0.10	0.02	0.14
Luxembourg	449	0.53	0.32	0.15	0.15	0.16	0.21	0.08	0.12	0.28
Hungary	889	0.56	0.28	0.16	0.39	0.06	0.26	0.07	0.04	0.18
Malta	262	0.53	0.38	0.09	0.26	0.05	0.37	0.08	0.05	0.19
Netherlands	859	0.42	0.38	0.20	0.25	0.06	0.24	0.10	0.07	0.29
Austria	891	0.47	0.32	0.21	0.35	0.08	0.25	0.08	0.08	0.16
Poland	1078	0.46	0.39	0.14	0.51	0.09	0.20	0.03	0.08	0.08
Portugal	945	0.58	0.30	0.12	0.41	0.10	0.28	0.06	0.02	0.14
Romania	477	0.46	0.29	0.26	0.40	0.11	0.28	0.07	0.01	0.13
Slovenia	416	0.48	0.39	0.13	0.50	0.07	0.20	0.06	0.02	0.16
Slovakia	432	0.50	0.33	0.17	0.42	0.08	0.21	0.10	0.05	0.14
Finland	884	0.51	0.31	0.18	0.35	0.07	0.22	0.07	0.05	0.24
Sweden	891	0.44	0.34	0.22	0.31	0.06	0.18	0.07	0.08	0.29
UK	1366	0.54	0.32	0.14	0.22	0.05	0.35	0.10	0.05	0.23
EU countries	21955	0.52	0.32	0.16	0.35	0.08	0.26	0.08	0.05	0.19
Iceland	408	0.77	0.19	0.04	0.26	0.09	0.27	0.05	0.05	0.27
Montenegro	225	0.63	0.32	0.06	0.16	0.07	0.49	0.09	0.04	0.16
Nort Macedonia	395	0.58	0.32	0.10	0.42	0.12	0.21	0.08	0.05	0.12
Turkey	1322	0.45	0.35	0.20	0.54	0.11	0.14	0.09	0.06	0.07
Non-EU countries	2350	0.55	0.31	0.14	0.44	0.10	0.21	0.08	0.06	0.12

Notes: Source: own elaboration using ECS 2013.

Figure B1: Trade union dissimilarity index and density (OECD) in 2013
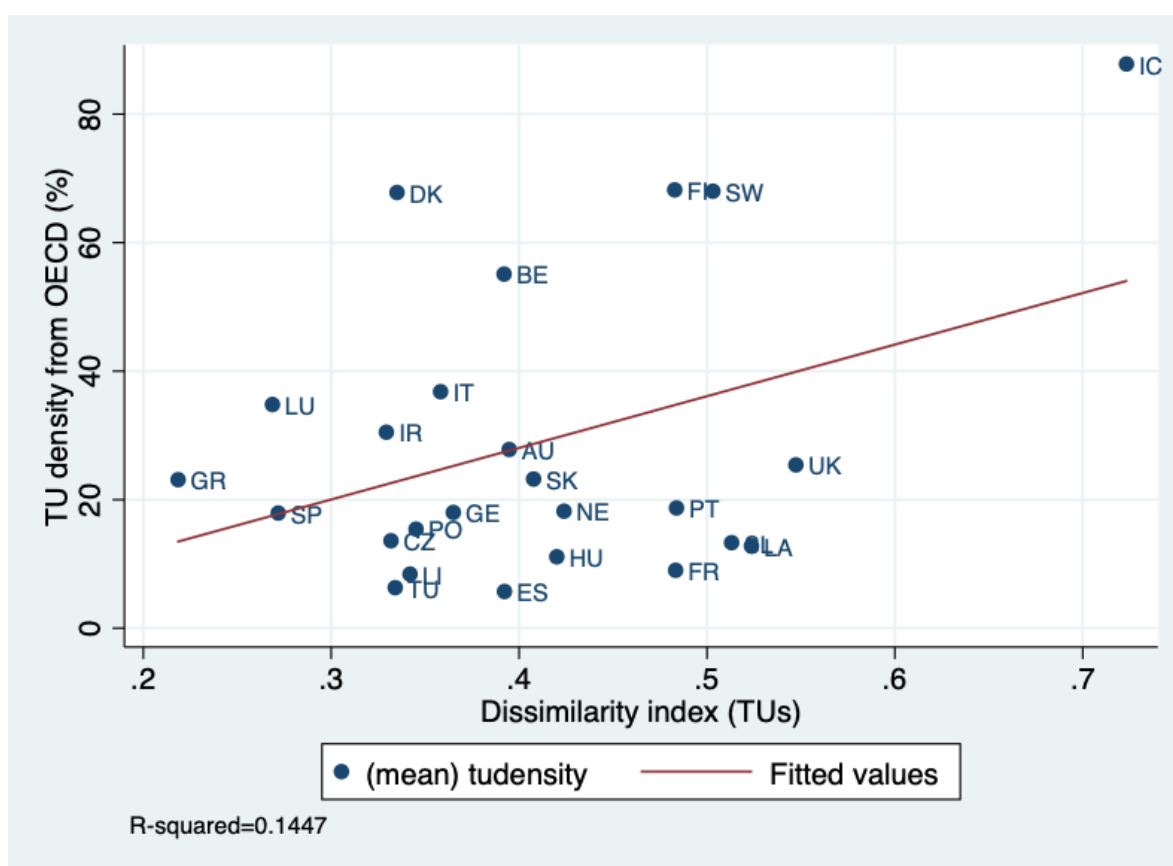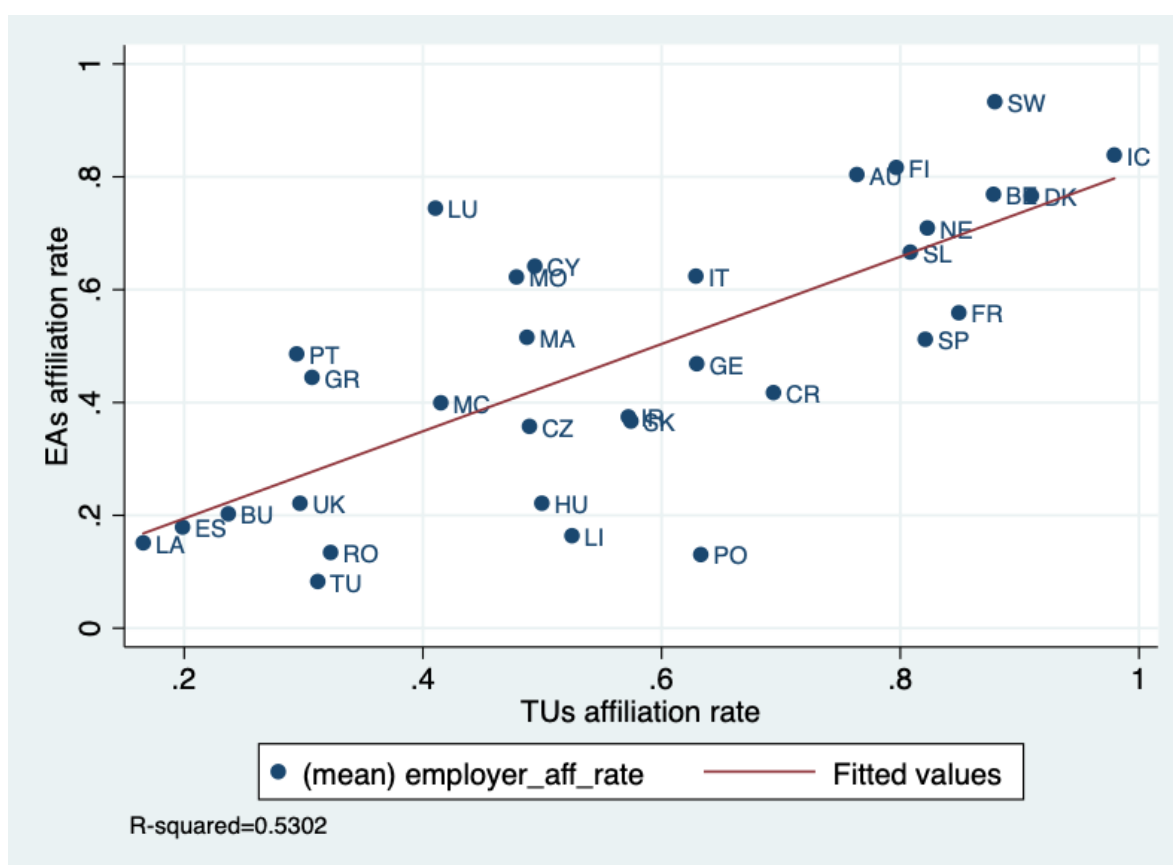
Notes: Source: Authors' analysis based on the European Company Survey 2013 (dissimilarity index) and OECD data (density).

Table B2: Robustness: different methodological approaches

| Country	(1) Without Allen et al. (2015) bias correction				(2) Without employment approximation			
	EAs affiliation rate	EAs dissimilarity index	TUs affiliation rate	TUs dissimilarity index	EAs affiliation rate	EAs dissimilarity index	TUs affiliation rate	TUs dissimilarity index
Belgium	76.9%	39.1%	87.8%	59.9%	61.3%	40.5%	63.5%	47.0%
Bulgaria	20.3%	39.6%	23.7%	53.2%	12.9%	42.1%	13.0%	50.7%
Czech Republic	35.6%	31.9%	48.8%	41.2%	22.0%	40.6%	29.0%	46.1%
Denmark	76.6%	37.5%	91.0%	44.8%	67.7%	35.0%	79.9%	25.6%
Germany	46.9%	26.0%	63.0%	38.2%	34.3%	29.2%	39.9%	51.2%
Estonia	17.9%	39.0%	19.8%	46.1%	10.9%	34.6%	9.7%	37.2%
Ireland	37.5%	31.5%	57.2%	34.2%	29.7%	27.2%	37.4%	30.5%
Greece	44.4%	44.6%	30.7%	31.7%	27.0%	30.1%	17.2%	27.4%
Spain	51.3%	19.4%	82.1%	44.7%	40.6%	22.8%	62.1%	23.5%
France	55.9%	19.1%	85.0%	52.9%	45.1%	24.6%	60.3%	55.2%
Croatia	41.8%	28.8%	69.4%	51.5%	26.8%	49.4%	46.2%	43.0%
Italy	62.5%	30.6%	62.9%	42.7%	46.8%	26.7%	42.0%	36.1%
Cyprus	64.2%	34.6%	49.4%	31.2%	52.1%	27.1%	39.2%	28.3%
Latvia	15.1%	51.8%	16.6%	55.3%	11.5%	49.2%	8.1%	52.0%
Lithuania	16.4%	32.2%	52.5%	37.1%	11.2%	31.7%	32.8%	39.3%
Luxembourg	74.0%	28.2%	41.7%	30.0%	62.3%	27.3%	39.1%	17.9%
Hungary	22.1%	21.2%	50.0%	43.7%	15.5%	23.5%	25.9%	40.5%
Malta	52.5%	58.0%	47.8%	73.0%	33.9%	47.4%	29.4%	62.9%
Netherlands	70.9%	29.0%	82.3%	52.1%	63.9%	23.7%	60.7%	42.4%
Austria	80.4%	38.5%	76.4%	51.4%	72.9%	25.8%	48.7%	51.6%
Poland	13.1%	16.0%	63.2%	30.9%	11.8%	14.7%	41.4%	41.3%
Portugal	48.6%	33.2%	29.4%	46.8%	37.7%	25.9%	13.0%	41.9%
Romania	13.5%	33.9%	32.5%	36.7%	10.6%	42.2%	19.7%	45.3%
Slovenia	66.8%	39.9%	81.0%	52.7%	44.1%	49.7%	57.6%	55.3%
Slovakia	36.7%	50.9%	57.4%	44.3%	17.3%	54.2%	34.0%	37.9%
Finland	81.7%	37.2%	79.7%	61.4%	66.1%	31.3%	52.9%	37.6%
Sweden	93.3%	49.0%	88.0%	52.6%	85.8%	41.3%	72.3%	42.7%
United Kingdom	22.1%	35.0%	29.7%	44.8%	14.0%	38.8%	19.0%	43.5%
Iceland	83.9%	58.3%	97.9%	69.3%	68.9%	30.7%	96.4%	57.7%
Montenegro	62.2%	45.2%	47.8%	62.8%	45.5%	28.8%	24.1%	46.4%
North Macedonia	39.9%	29.2%	41.5%	53.1%	25.6%	33.3%	25.6%	42.7%
Turkey	8.3%	37.6%	31.2%	19.7%	4.6%	41.1%	39.8%	26.2%

Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data. The columns on the left-hand side do not apply the Allen et al. (2015) correction and consider all firm-size/industry cells in all countries. The columns on the right-hand side consider all firms equally, regardless of their size (category).

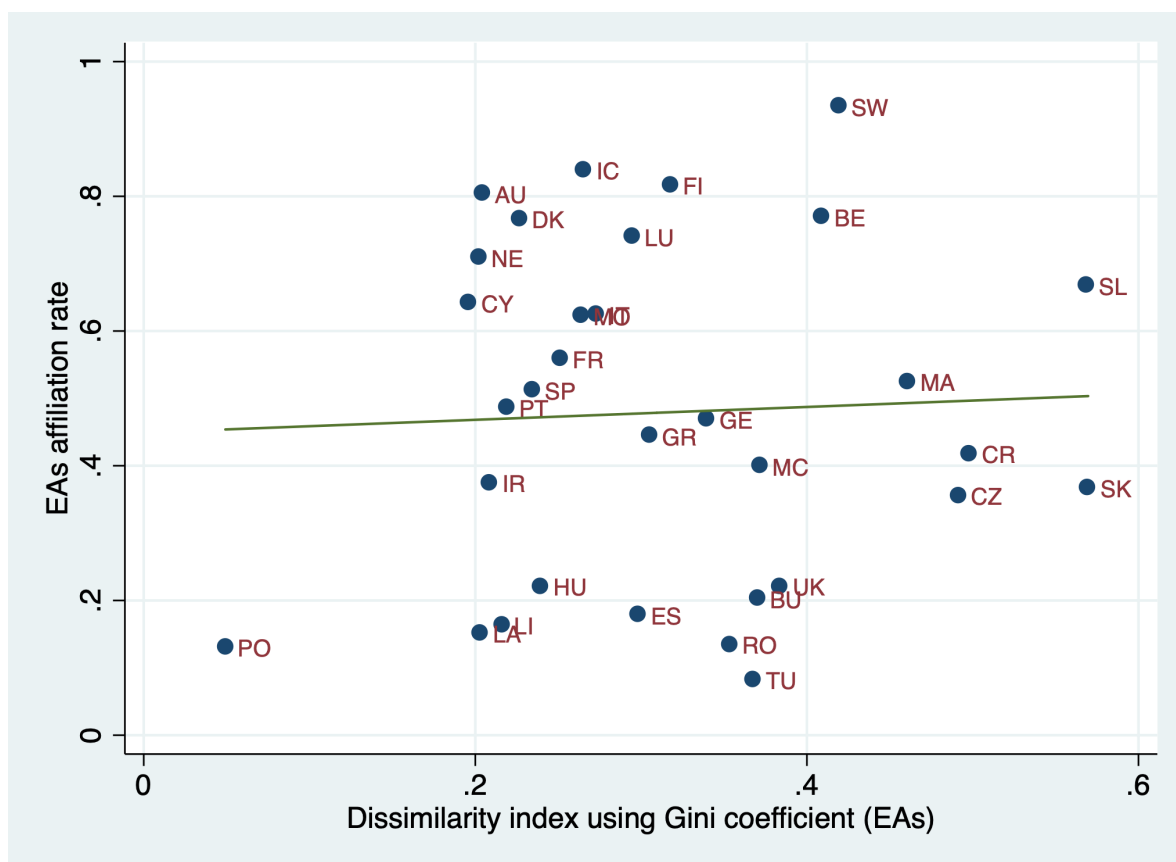Figure B2: Employers' associations and trade unions affiliation rates across countries

Notes: Source: Authors' analysis based on the European Company Survey 2013.

Figure B3: Employers' associations and trade unions dissimilarity indices across countries
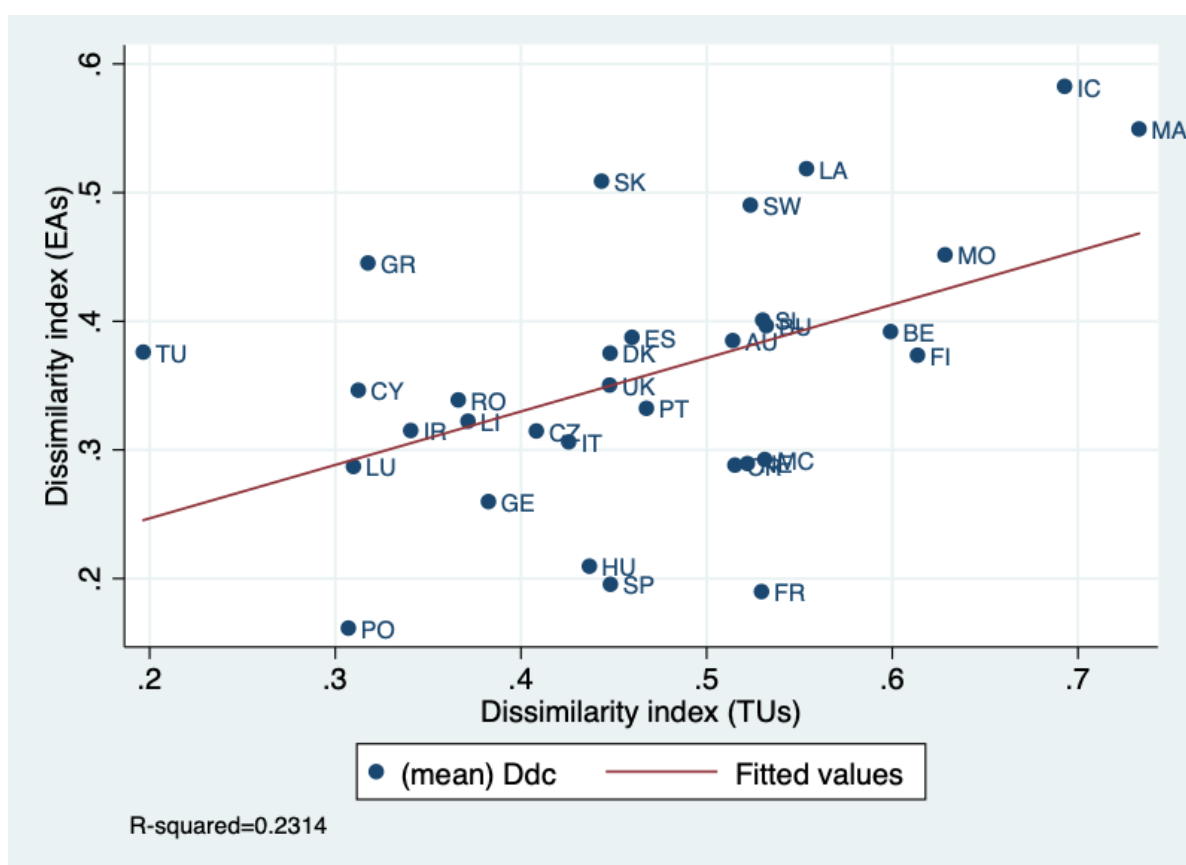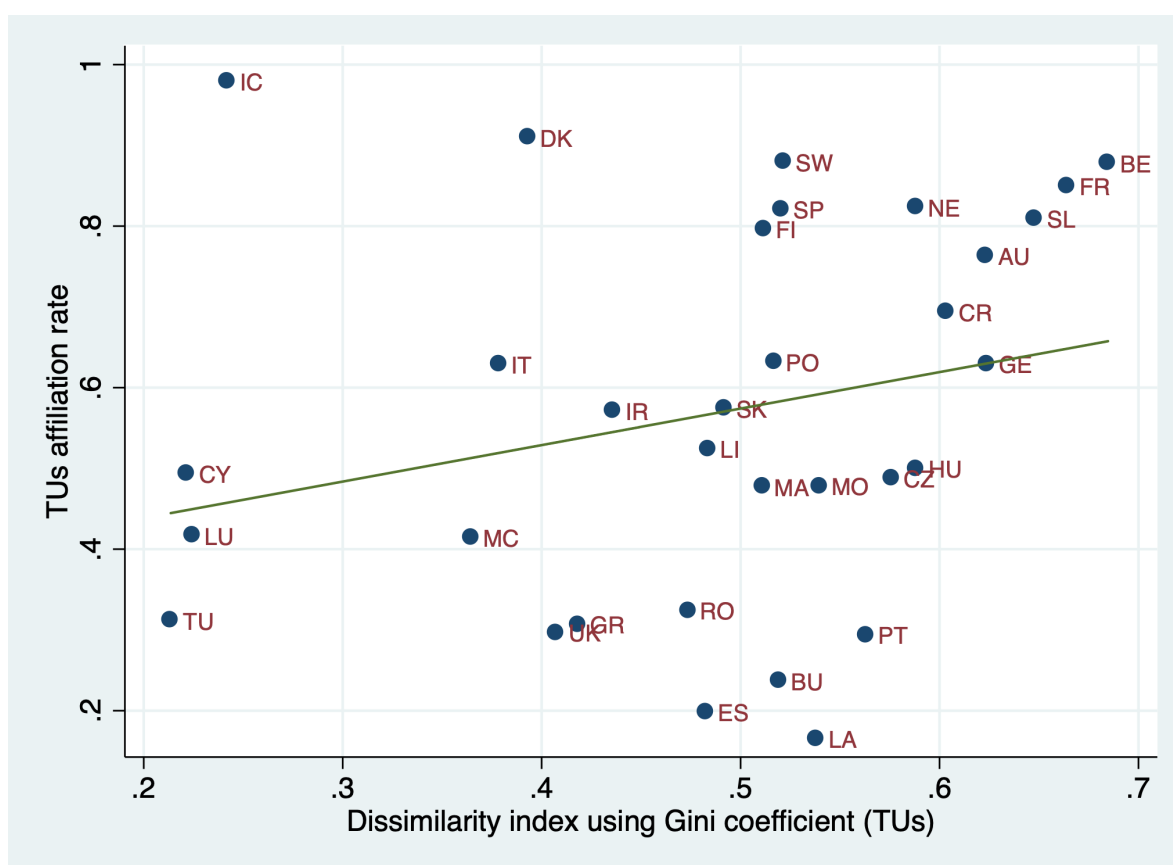
Notes: Source: Authors' analysis based on the European Company Survey 2013.

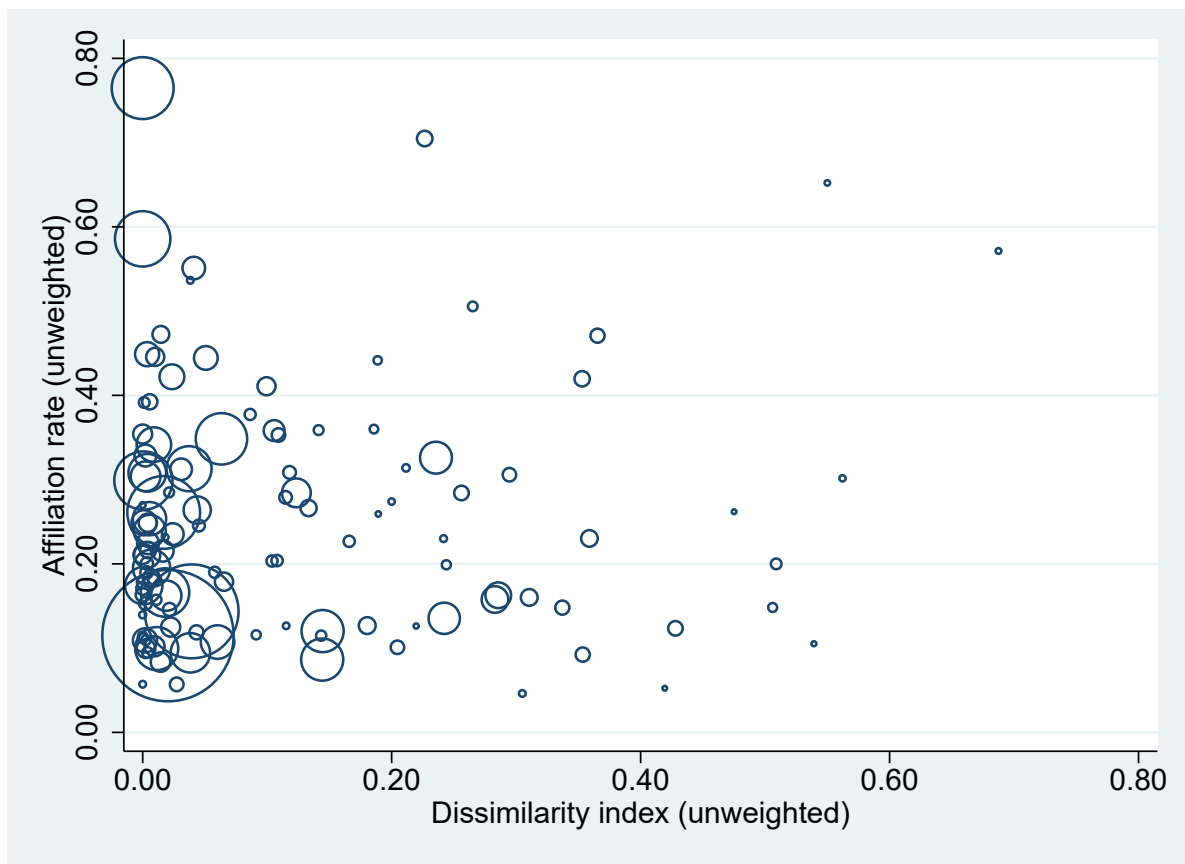Figure B4: Employers' associations Gini index and affiliation rates across countries

Figure B5: Trade unions' Gini index and affiliation rates across countries

Figure B6: Employers' associations dissimilarity index and affiliation rates in Portugal

Table B3: Employers' associations dissimilarity index and affiliation rates in Portugal (1/2)

| Number of firms	EAs affiliation rate (unweighted)	EAs dissimilarity index	Number of workers	EAs affiliation rate (weighted)	EAs dissimilarity index (weighted)
24	0.14	0.00	145	0.11	0.00
95	0.16	0.00	369	0.19	0.00
446	0.16	0.02	2936	0.23	0.23
675	0.19	0.01	4071	0.25	0.03
74	0.20	0.00	229	0.17	0.05
176	0.35	0.00	741	0.43	0.00
305	0.25	0.00	1431	0.31	0.01
163	0.25	0.00	727	0.29	0.05
169	0.10	0.00	844	0.12	0.04
987	0.31	0.04	14748	0.46	0.18
330	0.21	0.00	1946	0.27	0.04
195	0.10	0.01	1380	0.15	0.10
113	0.39	0.01	426	0.39	0.10
64	0.18	0.00	214	0.20	0.00
136	0.16	0.31	7719	0.51	0.36
36	0.36	0.19	1923	0.51	0.23
2570	0.26	0.02	39901	0.49	0.33
20	0.27	0.20	614	0.51	0.46
12	0.11	0.54	18476	0.49	0.14
547	0.11	0.06	9291	0.19	0.19
22	0.23	0.02	430	0.34	0.09
92	0.06	0.03	833	0.10	0.11
80	0.15	0.00	334	0.14	0.10
99	0.09	0.35	37998	0.61	0.41
62	0.20	0.11	1805	0.39	0.17
224	0.22	0.02	2612	0.31	0.16
862	0.09	0.14	25732	0.32	0.43
538	0.25	0.01	3066	0.31	0.03
125	0.22	0.00	539	0.27	0.09
692	0.31	0.00	3262	0.33	0.09
56	0.39	0.00	820	0.46	0.13
143	0.18	0.01	961	0.24	0.30
178	0.13	0.02	1482	0.19	0.16
11	0.05	0.42	948	0.33	0.57
46	0.11	0.00	119	0.14	0.00
164	0.21	0.00	704	0.34	0.00
51	0.11	0.14	1317	0.19	0.27
160	0.45	0.01	695	0.42	0.23
61	0.19	0.06	981	0.38	0.16
1137	0.17	0.02	9219	0.25	0.16
211	0.36	0.11	10606	0.61	0.29
321	0.16	0.29	18061	0.45	0.41
13	0.13	0.22	311	0.29	0.57
97	0.15	0.34	8078	0.48	0.36
229	0.24	0.02	3497	0.36	0.11
864	0.12	0.14	36755	0.29	0.30
22	0.54	0.04	435	0.64	0.06
4284	0.14	0.04	69681	0.24	0.14
60	0.38	0.09	1355	0.53	0.15
227	0.31	0.03	4137	0.44	0.24
16	0.57	0.69	2702	0.94	0.95
283	0.11	0.00	2655	0.19	0.06
137	0.47	0.01	1004	0.62	0.22
90	0.35	0.11	2626	0.59	0.19
51	0.16	0.01	501	0.20	0.11
75	0.19	0.00	396	0.26	0.06
499	0.24	0.01	3234	0.28	0.07
60	0.20	0.10	1449	0.39	0.31
54	0.09	0.00	233	0.11	0.11
159	0.41	0.10	4376	0.68	0.29

Notes: Source: Authors' analysis based on Quadros de Pessoal (2010). Each row corresponds to a different EA.

Table B4: Employers' associations dissimilarity index and affiliation rates in Portugal (2/2)

| Number of firms	EAs affiliation rate (unweighted)	EAs dissimilarity index	Number of workers	EAs affiliation rate (weighted)	EAs dissimilarity index (weighted)
127	0.27	0.13	5052	0.46	0.23
232	0.22	0.00	987	0.27	0.15
81	0.17	0.00	330	0.21	0.00
17	0.27	0.00	303	0.58	0.00
1286	0.35	0.06	25409	0.58	0.29
1492	0.59	0.00	2929	0.59	0.00
97	0.47	0.37	9462	0.81	0.27
77	0.28	0.11	1880	0.51	0.32
1862	0.76	0.00	12210	0.78	0.00
475	0.14	0.24	23648	0.36	0.48
40	0.11	0.00	146	0.14	0.00
89	0.10	0.20	4599	0.44	0.55
41	0.12	0.09	1374	0.42	0.66
579	0.34	0.01	6874	0.41	0.08
85	0.15	0.02	589	0.25	0.13
19	0.30	0.56	2816	0.58	0.15
15	0.65	0.55	1443	0.84	0.38
281	0.45	0.00	1407	0.49	0.05
46	0.11	0.00	181	0.13	0.06
40	0.20	0.24	3403	0.46	0.18
27	0.31	0.21	1821	0.60	0.48
47	0.36	0.14	1472	0.54	0.14
79	0.31	0.12	2759	0.61	0.26
298	0.42	0.02	3389	0.62	0.33
493	0.33	0.24	21061	0.61	0.51
402	0.28	0.12	10784	0.56	0.41
39	0.15	0.51	4411	0.51	0.29
89	0.31	0.29	10398	0.64	0.41
137	0.13	0.18	9392	0.26	0.16
115	0.42	0.35	8971	0.75	0.40
272	0.44	0.05	4659	0.70	0.47
23	0.23	0.24	24096	0.58	0.13
21	0.13	0.12	409	0.20	0.54
14	0.26	0.19	979	0.67	0.57
430	0.30	0.00	1536	0.34	0.04
97	0.12	0.04	1615	0.27	0.07
103	0.12	0.43	16345	0.49	0.23
184	0.08	0.01	2167	0.16	0.11
117	0.70	0.23	58725	0.97	0.77
678	0.17	0.00	2425	0.21	0.06
248	0.55	0.04	5736	0.72	0.12
68	0.25	0.05	1354	0.33	0.31
134	0.23	0.36	81802	0.77	0.51
61	0.23	0.17	2502	0.60	0.57
47	0.28	0.02	372	0.43	0.34
56	0.20	0.51	8332	0.71	0.24
52	0.18	0.01	378	0.21	0.12
161	0.18	0.07	3638	0.34	0.19
45	0.51	0.27	2275	0.75	0.25
360	0.26	0.04	5344	0.42	0.19
11	0.26	0.48	822	0.30	0.59
104	0.28	0.26	6104	0.58	0.35
34	0.44	0.19	1436	0.79	0.26
232	0.33	0.00	1281	0.44	0.03
1653	0.30	0.00	8783	0.36	0.03
345	0.16	0.28	20916	0.42	0.34
899	0.10	0.01	8689	0.17	0.07
22	0.06	0.00	289	0.12	0.00
22	0.05	0.30	1140	0.30	0.42
8383	0.11	0.02	93635	0.16	0.09
755	0.09	0.04	14853	0.22	0.34

Notes: Source: Authors' analysis based on Quadros de Pessoal (2010). Each row corresponds to a different EA.

Figure B7: Employers' associations dissimilarity index and unemployment rate
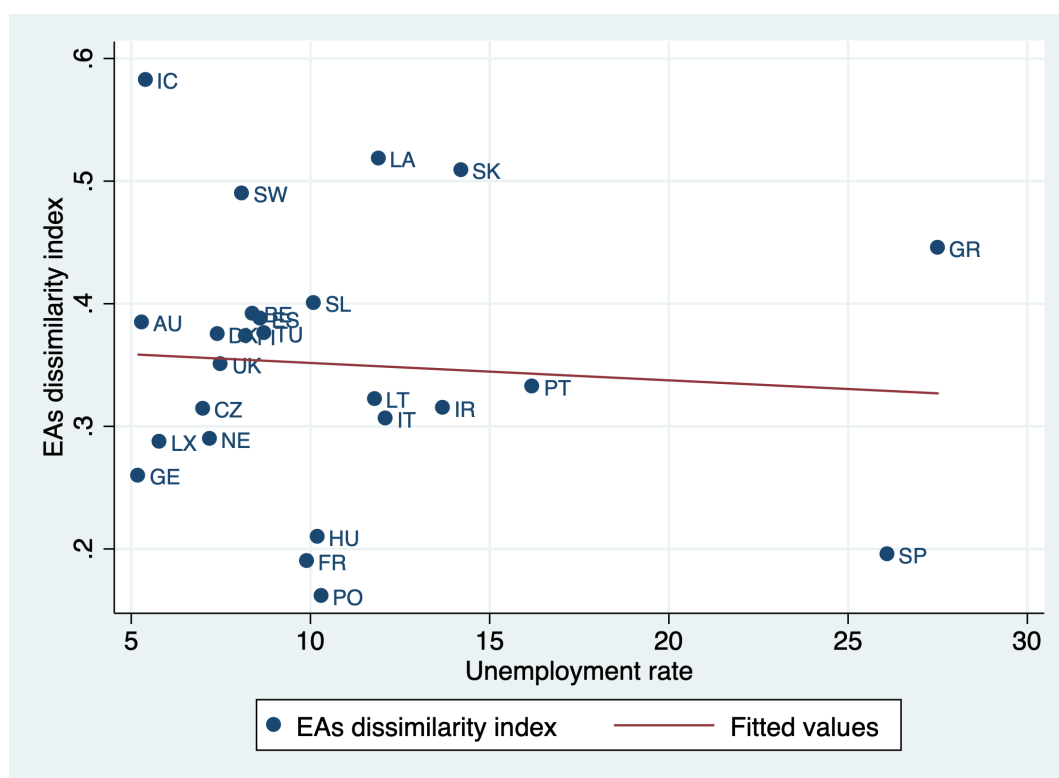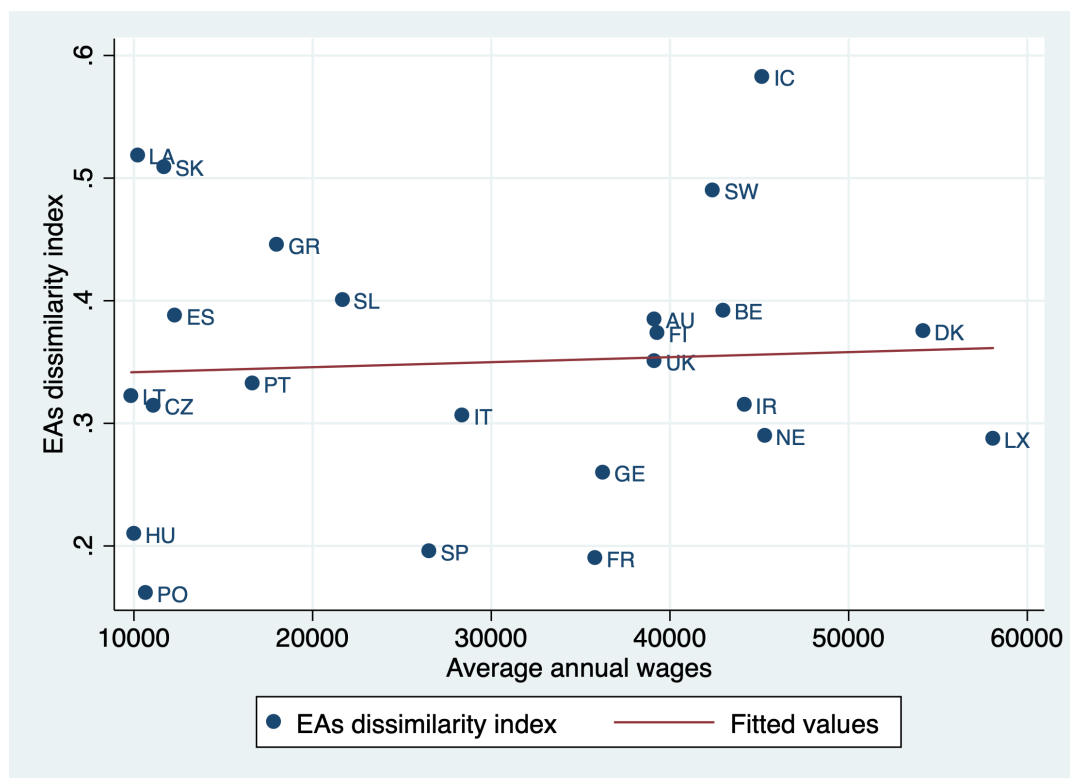

Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data.

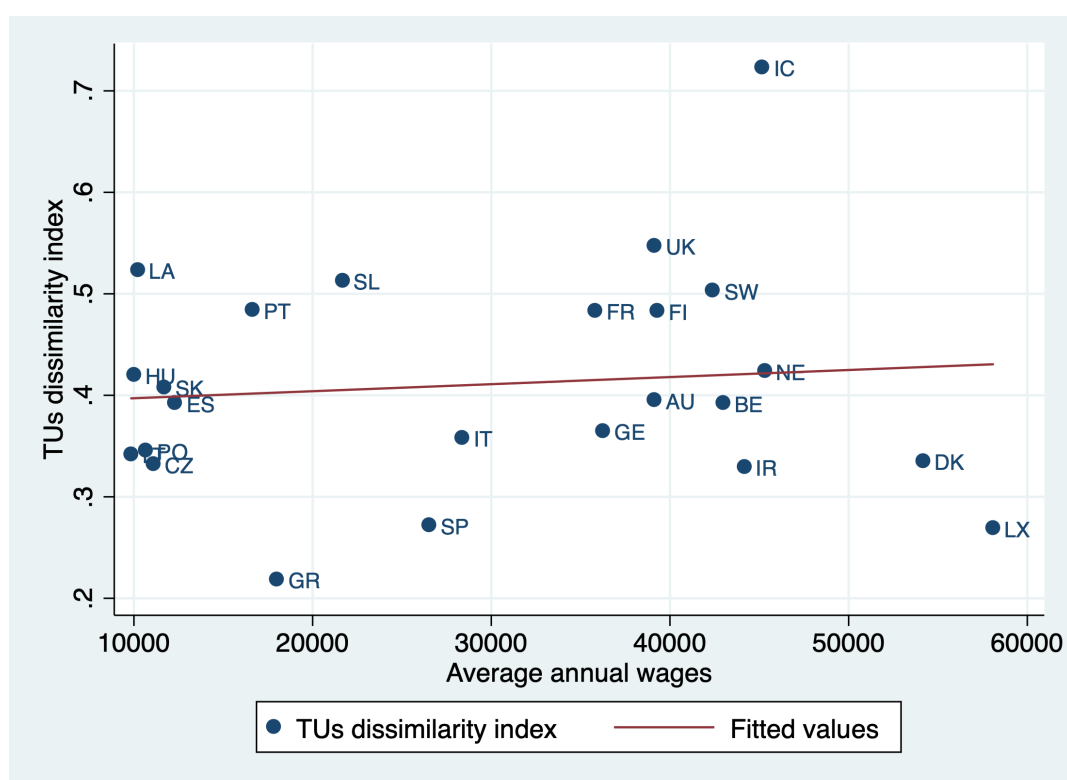Figure B8: Employers' associations dissimilarity index and unemployment rate
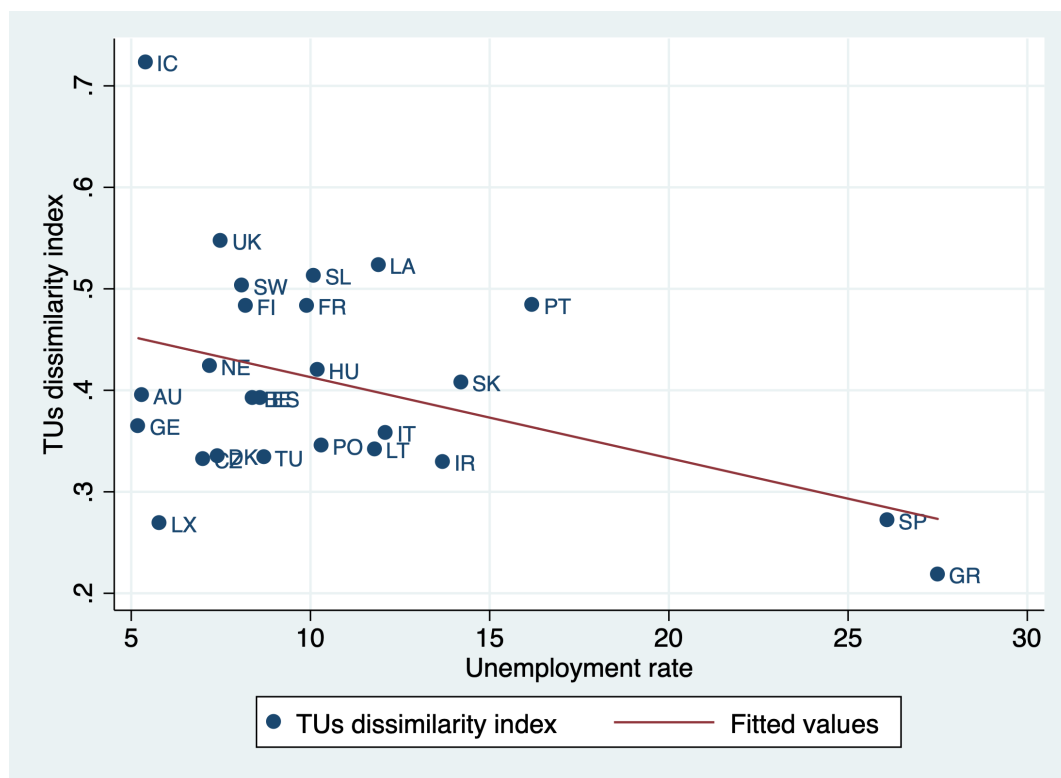
Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data.

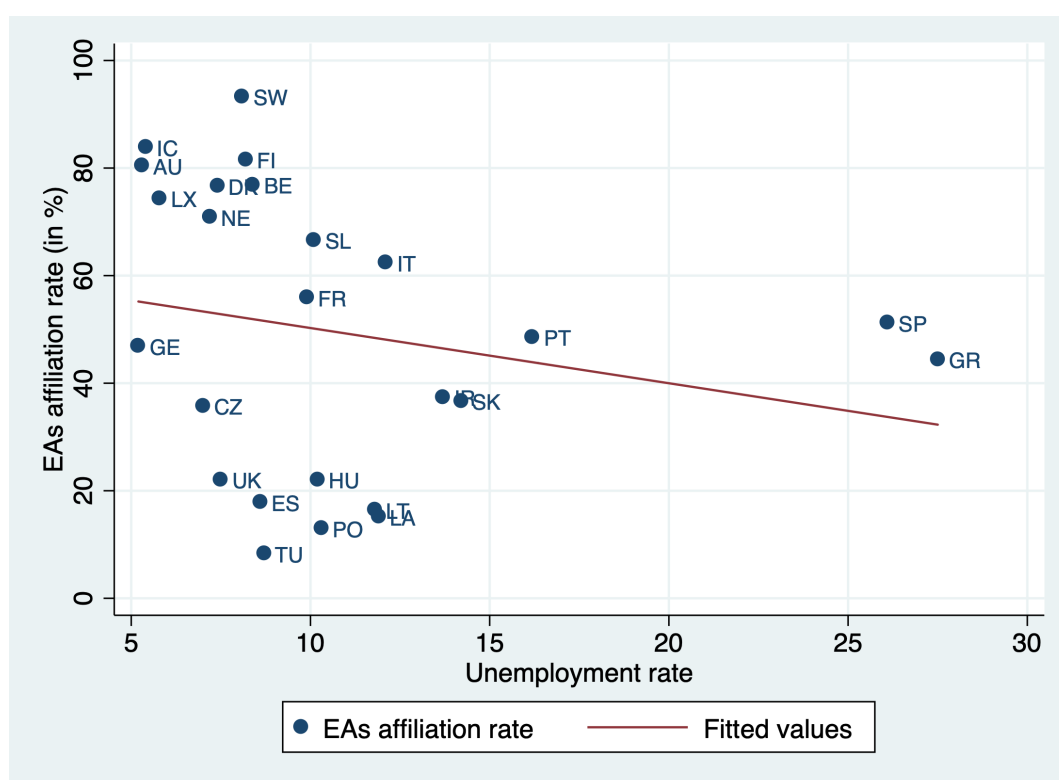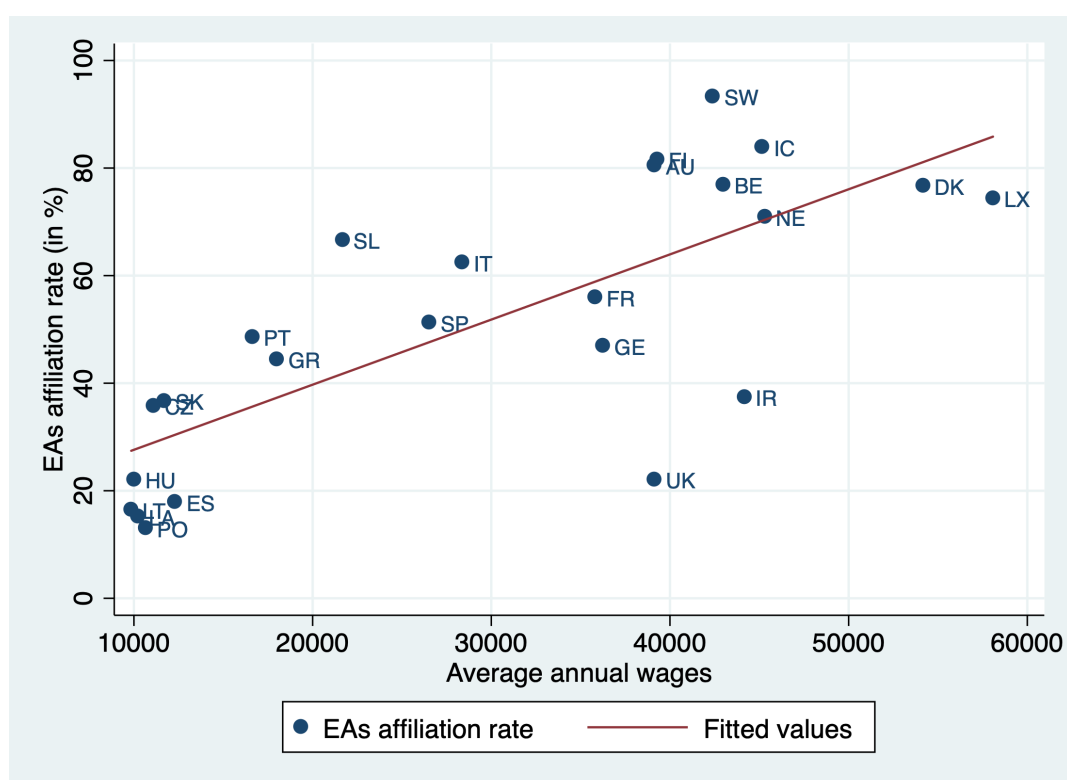Figure B9: Employers' associations dissimilarity index and annual wages

Figure B10: Employers' associations dissimilarity index and annual wages

Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data.

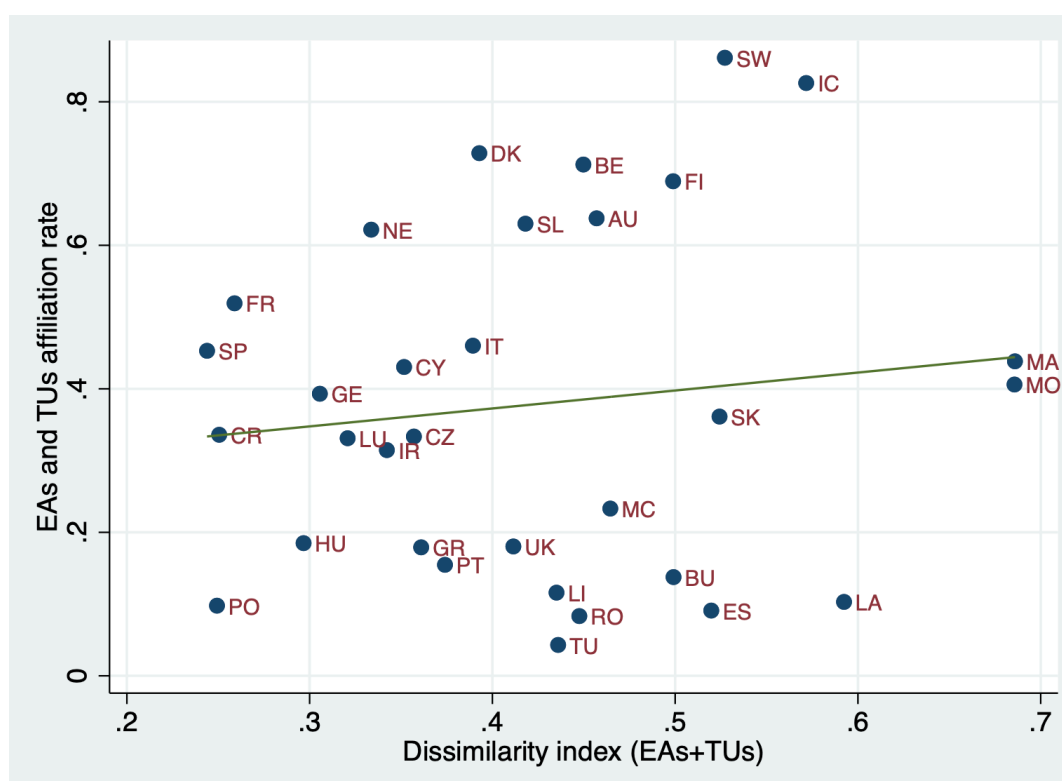Figure B11: Employers' associations affiliation rate and unemployment

Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data.

Figure B12: Employers' associations affiliation rate and annual wages

Notes: Source: Authors' analysis based on the European Company Survey 2013 and OECD data.

Figure B13: Employers' associations and trade unions' dissimilarity index and affiliation rates across countries

Notes: Source: Authors' analysis based on the European Company Survey 2013. Fitted line in red.