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Networked Coordination of Industrial Relations

Bargaining in Networks: A Comparative Analysis of Coordination in Collective Bargaining

Oscar Molina
Joel Martí
Alejandro Godino

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General contact: quit@uab.cat

Centre d'Estudis Sociològics sobre la Vida Quotidiana i el Treball - QUIT
Universitat Autònoma de Barcelona
Campus UAB, Edifici B- C/ de la Fortuna s/n
08193 BELLATERRA, Spain

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List of acronyms

AWVN	Dutch General Employers' Association
CB	Collective Bargaining
EMU	European Monetary Union
FEIQUE	Employers' Federation of the Spanish Chemical Industry
ICTWSS	Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts database
NCA	National Collective Agreement
SIPTU	Services Industrial Professional and Technical Union
SMEs	Small and Medium Enterprises
SNA	Social Network Analysis
VGL	Dutch supermarket chain employers' association

Introduction

The analysis of collective bargaining coordination has attracted the attention of scholars and policy-makers since the early 1990s, but has witnessed a renaissance more recently in the context of generalised de-centralization and the new constraints imposed by the EMU (Glassner and Pochet 2011, Soskice and Iversen 2003). Originally, coordination was presented as a dimension of collective bargaining considered alternative to centralization, as it focused on processes rather than structures. However, the reality was that all coordination indexes and scores tended to reflect structural characteristics of collective bargaining and provided limited insights on the processes and relational aspects underpinning coordination (Traxler and Kittel 2000).

In this way, most studies have paid attention to the level where coordination occurs, assuming a correspondence between formal roles across levels and actors. A strong focus on structures has resulted in limited knowledge about the actual mechanisms that industrial relations actors deploy to solve coordination problems. Despite growing research on the comparative analysis of collective bargaining coordination and its impact, we still lack profound knowledge about the mechanisms sustaining coordination; how information flows between actors in the collective bargaining structure; or the mechanisms used by actors in bargaining processes to reach an agreement.

The objective of the NETWIR project is to provide an alternative assessment of how coordination takes places in different collective bargaining systems and sectors. In order to do so, the project adopts a behavioural and relational view based on the methodological and analytical tools of Social Network Analysis (SNA). By doing so, it provides for the first-time comparative evidence on the relational dimension of coordination by exploring collective bargaining networks, thus complementing the institutional studies already available[1].

The network as a theoretical framework or as a metaphor has been referred in several industrial relations studies (Saundry et al 2011, Fichter and Sydow 2012), but few of them have applied the methodology in a rigorous way. Networks have been used first of all in relation to actors, and more specifically, trade unions. Building upon the social movement literature (Diani 2000), several authors have conceptualized trade unions as networks. Thus, Roca (2016) analysed patterns of trade union recruitment and affiliation using this

[1] This comparative report has relied for the analsysis on Section III on the NETWIR National Country Reports elaborated by the partners in the project. The country report for the Netherlands has been elaborated by Wike Been and Maarten Keuen (Been and Keune 2020); the country report for Italy has been elaborated by Andrea Bottalico, Luigi Burroni and Anna Mori (Burroni, Mori and Bottalico 2020); the country report for Ireland has been elaborated by Liam Kneafsey and Aidan Regan (Regan and Kneafsey 2020); the country report for Spain has been elaborated by Alejandro Godino, Joel Martí and Óscar Molina (Molina and Godino 2020). All national reports are available at the NETWIR webpage: http://netw-ir.eu/reports/.

mechanism in the case of some small unions in Spain. In a similar way, Peetz et al. (2016) used this tool in order to study union delegate networks in Australia.

However, when it comes to analysing the network relations underpinning collective bargaining, we find several references to the network idea in transnational or cross-border collective bargaining (Gollbach and Schulten 2000, Schulten 2003) but hardly anything when it comes collective bargaining at national level. The single most interesting analysis for the sake of this project was made by Öberg et al. (2002). These authors used some of the tools of SNA in order to understand which actors are the most influential in labour market policy, how much trust there is among them as well as the type and degree of communication in the network. These authors also explored patterns and mechanisms of coordination, paying particular attention to trust and power (Svensson and Öberg 2006). But this study constitutes an honourable exception in relation to the application of SNA to collective bargaining. Methodological difficulties as well as the dominance of institutionalist approaches to collective bargaining analysis are the main explanations for the lack of scholarly attention. In this view, collective bargaining would be better depicted in terms of a small number of actors who meet regularly and take decisions based on routine negotiations and with little scope for non-formalised interactions and coordination.

The relational view on coordination pays attention to the actual roles and interactions of actors, not their formal attributions in the collective bargaining structure. Social network methods are particularly well suited for dealing with multiple levels of analysis and multi-modal data structures, as is the case of collective bargaining systems in most EU countries. In particular, two-mode or affiliation networks (Borgatti and Everett 1997) provide a specific type of network with two different sets of nodes (individuals and events), and ties existing only between nodes belonging to different sets. The inclusion of events is particularly relevant in the case of collective bargaining due to their importance in negotiation processes.

The report presents results from a comparative analysis of collective bargaining networks in four countries and two sectors and discusses findings and methodological aspects at the light of the existing comparative industrial relations theories. In each country, collective bargaining networks in the pharmaceutical and retail sectors have been analysed. The results suggest an important role for non-formal interactions and forms of coordination in bargaining processes in all countries and sectors. These non-formal mechanisms for coordination exhibit variance but are particularly important in those sectors / countries with more decentralised bargaining structures. Moreover, the analysis of bargaining networks has allowed to identify the importance of intra-organizational coordination dynamics in order to reach inter-organizational coordination, with trade unions playing a particularly important role in decentralized settings. Whilst the national institutional frameworks seem to play a relevant role in shaping bargaining networks and interactions, the results also point to the existence of sectoral patterns in the forms of coordination.

The report is structured in four sections. Section I provides the analytical and theoretical framework for the implementation of SNA methodologies to collective bargaining. As the project had a strong methodological component, Section II provides a detailed account

of the methodology used in the NETWIR project. Section III then moves to the comparative analysis of bargaining networks in the four countries and the two sectors analysed; pharmaceuticals and retail. Finally, Section IV reflects on the benefits and challenges of applying SNA to the Industrial Relations field at the light of project's results.

SECTION I - The application of Social Network Analysis to Social Sciences and Industrial Relations

As an analytical tool, Social Network Analysis (SNA) has experienced over the last two decades a remarkable expansion and application to very diverse disciplines, including biology, physics, chemistry, management, psychology, political science, sociology etc (Borgatti et al. 2009). Moreover, the network concept has become one of the most important buzzwords in social sciences in recent years. The extension of the term to very diverse disciplines and its application to very distinct phenomena has nonetheless taken many forms. In some cases, the network concept has simply been used as a conceptual reference, or as metaphor (Knox et al. 2016). By contrast other works have applied Social Network Analysis methodology and tools more thoroughly.

In the case of social sciences, SNA was traditionally an instrument used by sociologists to understand the changing face of societies. This is well illustrated by Granovetter's weak ties theory (Granovetter 1973). Since then, SNA has spread to more areas of sociology, anthropology, political science etc. But the two areas of social sciences where SNA has received more attention in recent years are social movements in relation to collective action (Saunders 2007, Diani 2000) and policy networks (Kenis and Schneider 1991, Rhodes 2006).

In the case of social movements, social network analysis was used as a mechanism to reach a better understanding of the way social movements work, how collective identities are formed, how solidarity is built and information flows between actors involved in the network. In this area, the network idea has moved from being a metaphor (collective action explained by ties between different individuals or organizations) to one of the social science areas where the implementation of SNA has become more insightful (Diani 2002).

Another field of social sciences where SNA has received considerable attention is public policy through the use of policy networks. The primary focus of policy networks research has been on the type and consequences of networks. Just as with other disciplines and areas of study, the way in which the network concept enters the policy network literature is very diverse, being used most often as a metaphor and theory, rather than as an analytical tool and empirical approach (Börzel 1998). In the field of international relations,

policy networks are used to detect and analyse problems in diffuse organizations and international networks. Drew et al. (2011) used two-mode networks to visualize the complexity of interactions between individuals and organizations in the specific case of environmental protection organizations. Researchers have tended to emphasize variation in structure across different groups or contexts, using these differences to explain outcome variations (Borgatti et al. 2009: 894).

Under the general heading of policy networks, several related concepts / approaches have developed, but three of them are particularly important / relevant. First, the concept of leadership networks has been used to name the type of relations between those occupying top positions, including information exchange, capacity to act collectively and discourse harmonization (Hoppe and Reinelt 2010, Fransen et al. 2015). Second, the Advocacy Coalition Framework (ACF) has also developed in the field of public policy (Sabatier 1988, Ingold 2011). Sabatier defined ACF as those settings characterised by multiple actors and levels of government that produces decisions despite high levels of uncertainty and ambiguity. Finally, closely related to the policy network concept is the idea of network governance (Sørensen and Torfing 2007, Lewis 2011), which is particularly important for industrial relations and collective bargaining, and has experienced a remarkable growth in recent years.

According to Sørensen and Torfing (2007:9), governance networks can be defined as "a relatively stable horizontal articulation of interdependent actors; who interact through negotiations which take place within a framework that is self-regulating (within limits); and which contributes to the production of public purpose". By contrast, policy network can be defined as a social structure, comprising actors who interact in political processes across different levels rather than in what was formerly hierarchical policymaking (Coleman and Perl, 1999). Even though there is some degree of overlap between policy networks and network governance, a consensus seems to emerge on policy networks as key elements in network governance. In short, network governance rests on a recognition that policy is the result of governing processes that are not fully controlled by governments (network as a form of governance) (Lewis 2011: 1222) whilst policy networks refer to the idea of interest intermediation within these those governance networks. The insights provided by the literature on policy networks and governance networks are particularly useful for the analysis of collective bargaining networks provided the similarities in the object of research.

Understanding Collective Bargaining Coordination: a Relational Approach

Coordination of collective bargaining, and in particular, wage-setting coordination is considered a critical variable in order to understand how collective bargaining systems work and what is their impact on economic outcomes. This is particularly the case in the

context of the EMU as governments do no longer have the exchange rate as a policy instrument (Calmfors 1998, Hancké and Soskice 2003).

Centralization indexes became the standard benchmark to assess the impact of collective bargaining on economic performance in the 1980s under the neo-corporatist literature and the Calmfors and Driffill (1988) hump-shaped hypothesis. Only in the late 1980s-early 1990s, under the nascent literature on capitalist models and the unleashing of de-centralizing mechanisms, did coordination start to be proposed as an alternative dimension to centralization. Scale measures of coordination were made by Soskice (1990) and Hall and Franzese (1998), with the objective of providing a more accurate measure and replacing centralization indexes. However, it soon became clear that one-dimensional scale measurement of coordination presented more challenges than in the case of centralization. Kenworthy (2001) suggested a categorical score that tried to capture the diversity of mechanisms sustaining coordination of collective bargaining across countries whilst allowing to rank countries.

In the ICTWSS, J.Visser built upon the coordination score of Kenworthy, but introduced two complementary variables. First, he coded into two separate variables the degree and the type of wage coordination. The degree of coordination followed the score by Kenworthy whilst the type of coordination was based on Traxler, Blaschke and Kittel (2001). The 2015 version of the database introduced another related variable, i.e., the articulation of enterprise bargaining that captures the extent to which enterprise bargaining develops autonomously from multi-employer collective bargaining.

Notwithstanding the increase in number and quality of collective bargaining coordination measures, they nonetheless suffer from similar problems. In particular, the way in which coordination has been assessed and measured reproduces some of the shortcomings of previous indexes of collective bargaining centralization, as their focus remains pretty much structural. Adopting a structural / institutional perspective on coordination, misses the behavioural and relational dimension that is key to understand how actors coordinate in the bargaining system. In defining its path-setting coordination measure, Kenworthy (2001: 1) acknowledged this critical problem:

> *"Wage coordination is a behavioural concept. It refers to the degree of intentional harmonization in the wage setting process or, put another way, the degree to which "minor players" deliberately follow along with what the "major players" decide. In my view, measurement problems associated with trying to capture the actual degree to which various actors involved in the wage setting process deliberately harmonize their bargaining are severe. To do so in an accurate fashion, the researcher must factor in both the share of the work force whose wages are deliberately pegged to the agreement(s) reached by the major players and the degree to which minor players intentionally follow along (i.e., do they adhere more closely or less?). Obtaining the relevant information and deciding how to rank countries in a relatively objective fashion is likely to be extremely difficult".*

Its coordination measure, similarly to the one contained in the ICTWSS Database is accordingly not based on relations or behaviour, but "on the structural characteristics of the wage bargaining process. The scores represent a set of expectations about which institutional features of wage setting arrangements are likely to generate a greater degree of coordination. They represent a hypothesis or a prediction, rather than a measure per se" (Kenworthy 2001: 1).

In this passage, Kenworthy pointed out to two key elements. First, a different power-based approach to coordination, based on the interaction between weak and strong players. How strong players manage to align the interests of the weak ones is at the end of the day what coordination is about in any collective bargaining context. Adopting this approach, ranking countries would be extremely difficult and only a typology of different forms of coordination could be developed. Secondly, he already suggested the empirical challenges to implement such a strategy as it implies going beyond traditional methods and approaches.

The object of this project is to provide an alternative assessment of how coordination takes places in different collective bargaining systems and sectors and whether this explains observed differences in outcomes. In order to do so, the project adopts a behavioural and relational view on it. By doing so, it provides complementary evidence on collective bargaining coordination to the one already available.

Table 1. The structural and relational approaches towards collective bargaining coordination

Structural	Relational
Based on formal attributions of actors	Based on real interactions and relations
Roles and responsibilities	Information flows

The relational view on coordination pays attention to the actual roles and interactions of actors, not their formal attributions in the collective bargaining structure. In this vein, the relational approach towards collective bargaining coordination focuses on the analysis of interactions / connections between different actors at different levels and through different instances that allow to coordinate collective bargaining processes and outcomes.

The vertical and horizontal dimensions of collective bargaining coordination

The analysis of collective bargaining coordination, including most indexes and scores, have tended to focus on its vertical dimension, i.e., on the relationship between actors at different levels in the collective bargaining structure. However, collective bargaining

coordination has also a strong horizontal dimension. By horizontal coordination we mean coordination between collective bargaining units in similar levels. This form of coordination can take several forms, being pattern bargaining the most frequent. Pattern bargaining defines a situation where a certain firm or industry set the pattern for sequential negotiations in other firms or sectors (Traxler et al. 2008, Marshall and Merlo 2004). This coordination can take place for instance between companies (intra-industry pattern bargaining), sectors (inter-industry pattern bargaining) or even regions. The most well-known example of horizontal coordination is the pattern-bargaining system in Germany (with the role of the Metalworkers collective agreement) and Japan (with the Spring offensive). More recently, spillover effects both between sectors in one country, but also between countries, have also been measured (Lehr et al. 2018).

SECTION II – Empirical Strategy: How to use SNA for the study of collective bargaining coordination

Social Network Analysis and Collective Bargaining Coordination: Some Hypothesis for Empirical Analysis

In order to explore the coordination of collective bargaining from a relational point of view, the NETWIR project has applied the methodology and analytical tools of social network analysis. Social network analysis comprises theories and methods of investigating structural relations among social actors and explaining social outcomes as the result of connections at the individual, subgroup, and complete network levels of analysis (Knoke 2011).

Social Network analysis allows processing, analysing and visualizing relations between different actors (individuals or organisations) and patterns of connections within their populations. The micro-level foundations of social networks are concerned with people choosing to interact with one another in various ways. Such small-scale decisions aggregate to more meso-level social structures that can hinder or facilitate collective action by groups and organizations, such as coordination in collective bargaining.

In spite of its powerful analytical tools, it has seldom been applied to the study of industrial relations and more specifically collective bargaining coordination. The only study that has applied this methodology has been Svensson and Öberg (2005). In their work, these authors try to understand how coordination really works in one of the countries that systematically ranks high in coordination indexes and scores, i.e., Sweden. In particular,

through the use of social network methodology, they study whether coordination results from trust relations between actors or rather it relies on power and hierarchy.

The application of Social Network Analysis to the study of collective bargaining can bring several benefits to achieve a better understanding of industrial relations systems whilst providing new insights into the existing theories. First, it can help to understand which is the role of power, trust or hierarchies in sustaining collective bargaining coordination. Social network analysis not only provides useful descriptive information about the shape of collective bargaining networks (including density measures, centrality etc.), but most importantly for the sake of this project, analytical indicators related to the (power) position of an actor in the network. Second, it sheds additional light into the actors, levels and institutions that are critical for coordinating collective bargaining in different industrial relations systems. Third, it allows to observe how information flows between different actors and across levels in the collective bargaining system.

Several hypotheses can be formulated in relation to the characteristics and implications of bargaining networks and interactions within them for coordination in the sectors and countries analysed.

First, in those countries with more de-centralised and voluntarist industrial relations systems, we can expect informality and non-formalised interactions in the bargaining network to play a more important role in coordinating actors' behaviour. Despite the limited attention paid in industrial relations research to the issue of informality, some studies have explored the implications it has. Thus Regalia (1995) and Brown (1993) already pointed out to the problems brought by the informality characterising workplace representation in the Italian and UK industrial relations systems respectively.

Moreover, in those sectors and countries where a long-term record of cooperation already exists in collective bargaining, formal mechanisms might become less important and informal relations among network members' play a key role in bargaining processes. Similarly, it can be argued that formal mechanisms would provide guarantees to actors who are involved in processes where there are no previous cooperation experiences and trust among actors is limited.

Secondly, the role of inter and intra-organizational coordination or bargaining. In their seminal piece, Walton and McKersie (1965) distinguish four subprocesses in labour negotiations; distributive or zero-sum bargaining; integrative or positive-sum bargaining, attitudinal structuring and intra-organizational bargaining. Whilst the first three have to do with relations between unions and employer (inter-organizational bargaining), the last one takes place within the parties involved in negotiations and is aimed at reaching internal consensus and bringing a common position to collective bargaining. Therefore, in those bargaining contexts where there is a high fragmentation of interest representation on the trade union or employer side, we can expect a more crucial role for intra-organizational bargaining and coordination.

The analysis of bargaining networks also allows to study the degree of concentration or diffusion of power in the bargaining network. More specifically, in those contexts

characterised by low levels of fragmentation of social partners, we can expect power to be more concentrated. At the same time, we can expect more concentration in those bargaining contexts characterised by a stronger institutionalisation of processes compared to less formalised settings.

Social network analysis allows to compare power concentration across bargaining networks through synthetic indicators. One such indicator approaching us to the idea of power in networks is centrality. The number of direct ties an actor holds with others in the network—technically, the degree centrality—is one of the most basic and intuitive ways to measure power. However, depending on the nature of the ties, and on the type of impact or output the actors are seeking, other types of less intuitive centralities may be more relevant (Freeman 1979, Borgatti, Everett and Johnson 2018). For instance, in an influential paper, Bonacich (1987) suggests that, in bargaining situations, power comes from being connected to those who are powerless, as being connected to powerful others who have many potential trading partners reduces one's bargaining power. Hence, the power of an actor may be tied to the many direct ties of that actor as well as to the little ties of its direct contacts.

Other centrality indicators take into consideration whether an actor's direct contacts (alters) are (or are not) connected to each other. For instance, a distinction is made between the case in which an actor is positioned in a network where its alters are all densely connected to each other, and the case in which an actor sits on a structural hole, with all or most of its alters being unconnected to each other. These two positions convey different types of advantages. High closeness is normally considered a precondition for the emergence of trustful relations—an important governance mechanism, since it reduces both uncertainty and information asymmetries in the interactions between two actors (Coleman 1988). Also, close ties typically allow the exchange of more fine-grained information, which is more proprietary and tacit than the information exchanged in open networks; therefore, close ties also entail effective joint problem-solving arrangements that speed up responses to the market (Giuliani and Pietrobelli 2011: 9).

The central assumption underlying the focus on networks and network relations is that these relations and the interdependencies that come with them matter for the explanation of individual or collective behaviour. The cases (nodes) can be as diverse as individuals, organisations, etc. The links (ties) between the nodes can represent various kinds of relationships, such as collaboration, information exchange, consultation etc.

Methodology: Mixed Methods and the use of Two-Mode Networks to analyse collective bargaining coordination

Two major methodological flaws are common in works applying SNA, including those in industrial relations: a weak methodology guiding data collection and the lack of a mixed methodology that could enhance the explanatory power of network analysis.

In relation to the first problem, what we observe in most cases is that existing relational data was collected without a well-defined and rigorous strategy. Then SNA tools were used but lacking an articulation between the survey (method and questions included), the hypothesis to be tested and the type of network used (Svensson and Öberg 2005). A weak methodological operationalization explains the mostly descriptive and exploratory use of social network tools. However, when its application is made following a clear methodology, SNA generates highly valuable quantitative network indicators that may significantly contribute to explain outcomes. The objective of this project is precisely to advance in the application of SNA in order to explore collective bargaining coordination and its (different) outcomes across countries.

The second problem is related to the lack of mixed methodologies. Even though SNA can provide insightful relational evidence on collective bargaining coordination, it requires complementing it with other methods / evidence. It is accordingly important to acknowledge the limitations of network analysis, particularly when it comes to causality. Even though the analysis provides a very detailed description of the way coordination works (intensity + quantity of relations, central actors and their power, type of relations), two elements contribute to enhance the analytical capacity of SNA-based evidence:

- First, the comparative approach (countries + sectors) allows to provide analytical insights into the implications / outcomes of these coordination mechanisms.
- Secondly, in-depth semi-structured interviews have also been used in order to complement and help interpret SNA.

Two-Mode Networks: Contact Networks and Co-Attendance Networks

Social network methods are particularly well suited for dealing with multiple levels of analysis and multi-modal data structures, as is the case of collective bargaining systems in most EU countries. The analysis of collective bargaining coordination in two sectors and four countries has accordingly be made using two-mode networks. Two mode-networks (also known as affiliation networks) are those where their nodes may be separated into two classes, the links being between nodes of different classes only (Latapy et al. 2008: 31). In particular, two-mode networks provide a specific type of network where actors are embedded in (primary) contact networks and (secondary) event or co-attendance networks. Compared to one-mode networks, two-mode networks introduce the duality between persons and groups or events. In the case of collective bargaining, we can think of individual persons (a trade union or employer organization official) forming one mode and the interactions through events forming another mode.

The NETWIR project focuses on coordination in relation to specific events like formal / informal meetings, the signature of a collective agreement / wage agreement etc. Those coordination events also form nodes in the co-attendance network. We accordingly

adopt a different meaning of CB coordination in relation to the standard IR definition. In those countries where collective agreements at sectoral level are rare, the teams have detected other coordination events / mechanisms (as functional equivalents of collective agreements) at play that allow to build the network.

The adoption of this narrower approach to coordination is based on methodological considerations, and in particular, to the need to be able to trace back the whole network of actors involved in coordination.

Social network analysis has been implemented in two sectors in each country. The sectors have been selected taking into consideration the diversity in institutional contexts and constraints that may explain differences in degrees and forms of coordination. Two variables have been considered when selecting the sectors. First, the degree of exposure to international competition, or in other words, its predominance in exports in a given country; this sector is expected to exhibit a high degree of coordination. Secondly, the predominant skill level of the workforce in that sector. An agreement was reached around the study of the pharmaceuticals sector as a high-skilled and exposed sector. A weaker agreement seemed to emerge around retail as a low-skilled and non-exposed sector.

In order to enhance the theoretical implications deriving from the project, the two sectors analysed have been the same in all four countries. This allows to test the influence of the industrial relations system as well as other institutional variables on the forms of coordination, etc. Moreover, it also allows testing the influence of country size on coordination patterns.

The implementation of SNA Methodology in the NETWIR Project

In order to implement SNA tools to the analysis of collective bargaining coordination, the following steps have been followed:

Sampling

As we are using two-mode networks, sampling has consisted not only of actors, but also events.

The project's population includes all the actors involved in collective bargaining coordination in the two sectors selected and across the different levels considered. In order to do so, the partners have built a census of actors and events in the preparatory phase of the project. Semi-structured interviews with key actors have played a key role in elaborating the census of actors and events finally included in the study.

The period we are considering in the analysis are 4-5 years. In other words, we have tried to reconstruct the network in this period. This means we have tried to trace back the

coordination events taking place in this period, but also the actors that have been involved.

Modes and Level of Analysis

We adopt a two-mode research analysis strategy, considering actors / persons and events as the two modes. Regarding the level of analysis, the NETWIR project has considered all the levels involved in collective bargaining in the two sectors selected for analysis.

Incidence or affiliation data is particularly important in many social network analyses because it is "multi-level." Actors may be tied together because they are present in the same category (that is, they are in the same "incident" to, or are "affiliated" with the same structure). But such data also show how "incidents" are tied together by the "co-presence" of actors. Incidence data involving two kinds of actors (bi-partite) data are very important in network analysis because they are often our best window into questions of "agency and structure" or "macro-micro linkages."

Survey design[2]

All partners have been in the initial discussions about the questions to be included in the survey in the different project meetings held. The survey has also been discussed with all members of the research team in the preparatory and early implementation phases. The survey has included several questions aimed at understanding the role of the actor in relation to collective bargaining, considering the whole network. For this reason, the survey included several types of questions:

- Binary (0 / 1) in order to understand the existence of links with other actors in the network
- Multiple-category nominal measures of relations in order to assess the type of relations with other actors
- Grouped ordinal measures of relations in order to grasp information about the intensity and strength of ties between actors in the network
- Full-rank ordinal measures of relations in order to score the strength of all of the relations of an actor in a rank order from strongest to weakest

As the implementation of the survey has been online in a first stage, and then through telephone interviews in a second stage, it did not contain open questions in order to avoid any bias introduced by the survey technique.

The questions included in the survey have focused on the following aspects:

[2] Survey form available at: https://ddd.uab.cat/record/233126

- The influence or power of different actors in the network
- The need to coordinate with other actors in the network before negotiations around collective agreements
- The actual use of information provided by other actors in the collective bargaining network
- The quality of information provided by other actors in the collective bargaining network
- The intensity of relations between actors in the collective bargaining network.

Survey implementation

The implementation of the NETWIR survey has been made following a two-step procedure:

- In a first step, an online version of the questionnaire has been distributed among the actors identified. The online questionnaire has been made available through an online survey platform, and has been the same for all countries / sectors. In order to guarantee a high and satisfactory response rate, a follow up was made, including periodical reminders to those not having answered the questionnaire
- In a second step, and depending on the response rate, telephone interviews to those actors that have not answered online to the survey have been carried out.

Relational data are collected by asking actors about their relationships with other actors, which they have to identify and name. It differs from other approaches, as it deliberately asks about relationships between identifiable actors, and not between the respondent and general categories or groups of actors—suppliers, clients, universities, etc. This clearly makes confidentiality agreements with the respondents of critical importance, as some interviewees may be unwilling to provide relational information that involves other actors.

The survey was translated to the national language in each country and then distributed online among the actors in the network. After three rounds of email reminders to actors, telephone calls were also used in order to increase the response rate.

Data Processing (Matrices) and Visualization

Data obtained through the survey has been first of all processed using spreadsheets following the same template provided by the coordinator. Once the matrix has been built on the spreadsheet, it has been exported to a specific SNA software for the analysis and visualization. More specifically, partners in the NETWIR project have used VISONE (free

licence software for the analysis of social networks, https://visone.info/html/download.html) and UCINET.

The use of sociograms based on data matrices helps to provide a more compact and systematic view of network data. Moreover, sociograms are very effective tools in order to detect variations in the attributes of networks across sectors and / or countries.

Data Analysis

Two types of variables have been used when analysing data in order to find common patterns and explain variation:

- First, individual-level variables have been explored in order to understand what the most influential actors are, how connected they are and how coordination mechanisms flow from one actor to another.
- Second, structural variables have also been analysed in order to identify differences between sectors and / or countries. More specifically, structure-level variables provide information about cross-country and cross-sectoral differences in the density of relations / link in collective bargaining, reprocity etc.

General Survey Results

One of the main challenges facing the implementation of SNA is to achieve a high response rate to the survey. There are different approaches to assessing the response rate. The standard way of computing the global response rate to the survey is to divide the number of valid respondents by the initial population (i.e., actors in survey questions, identified in the qualitative exploratory stage). From an initial population of 187 people, the final sample of respondents is n=112 (59,9%). However, by countries & sectors, response rates vary between 8% and 90%, with a median of 63% (Table 2).

Table 2. Exploratory network and survey respondents in the four countries.

Country	Sector	Exploratory network size	Survey respondents	Survey response rate
Ireland	Pharma	10	9	90%
	Retail	13	1	8%
Italy	Pharma	16	10	63%
	Retail	15	12	80%
Netherlands	Pharma (Firm 1)	15	12	80%
	Pharma (Firm 2)	20	17	85%
	Retail	23	13	57%
Spain	Pharma	50	28	56%

Retail	25	10	40%
Total	**187**	**112**	**60%**

Source: NETWIR survey

As the network size was delimited ex ante relying on qualitative / exploratory interviews, a better measure of the real network size has been computed using a standard criteria for all countries. In this way, the final network boundaries have been delimited considering network members only those actors with a perceived influence on wage-setting higher than 1.5 (median value from a minimum of 1 and a maximum of 5 in a Likert scale). Thus, the final network size is the total number of actors with a perceived influence >1.5.

Applying this criterion and considering the final respondents to network questions in the survey, eight networks have been identified, with a median of 11 people (min=5 and max=23). The median response rate is 65% (with four networks above 70%). Although these response rates are not optimal and below the initial target, they are higher when considering only the most relevant actors (those with a perceived influence of 4 or more in a Likert's scale ranged from 1 to 5); in this case, the median response rate is 77% (with five networks above 70%) (Table 3).

Table 3. Network response rates (depending on network boundaries threshold).

Country	Sector	Post-fieldwork network size (median influence > 1,5)	Survey respondents (median influence > 1,5)	Survey respondents (median influence > 1,5)
Ireland	Pharma	6	6	100%
	Retail	0	0	0%
Italy	Pharma	16	5	31%
	Retail	14	11	79%
Netherlands	Pharma 1	14	10	71%
	Pharma 2	19	15	79%
	Retail	22	13	59%
Spain	Pharma	50	23	46%
	Retail	20	9	45%
Total		**161**	**92**	**65%**

Source: NETWIR survey

In this sample of respondents, there is an overrepresentation of the pharma sector, that in all countries has been the sector with the highest response rate, except in Italy. Moreover, there are more trade unionists than employers on the networks, something that we already anticipated due to the higher reluctance of employers to disclose information about bargaining processes and actors. Finally, except in the Spanish case, women are under-represented in the bargaining network (Table 4).

Table 4. Descriptive information of the Survey respondents.

		Ireland	Italy	Netherlands	Spain	Total
Sector	Pharma	9	10	29	28	76
	Retail	1	12	13	10	36
Side	Employer	2	11	14	19	46
	Union	8	11	27	19	65
	Other	0	0	1	0	1
Mail Role	Political	1	12	25	24	62
	Technical	9	10	2	13	34
	Union member	0	0	15	0	15
Sex	Female	2	4	12	12	30
	Male	8	18	30	26	82
Total		**10**	**22**	**42**	**38**	**112**

Source: NETWIR survey

In the sectoral analysis of bargaining networks, the network size refers to the total number of actors who have answered to the survey and have provided information. In some cases, actors responding to the survey have not answered all questions and we lack information about particular aspects (contacts, events attended etc.). When this is the case, we have omitted those actors and the network size may differ from the number of survey respondents.

Section III – A Comparative Analysis of Collective Bargaining Networks and Coordination

Before entering the analysis of collective bargaining networks in the two sectors and the four countries, it is important to consider the institutional context where coordination takes place. The form, level and degree of wage setting and collective bargaining coordination of the four countries analysed varies greatly[3]. A first important variable to consider is the degree of institutionalization. Among the countries compared, Spain stands out as a

[3] Section III of this report has relied for its contextual part on the analysis contained in the NETWIR National Country Reports elaborated by the partners in the project. The country report for the Netherlands has been elaborated by Wike Been and Maarten Keuen (Been and Keune 2020); the country report for Italy has been elaborated by Andrea Bottalico, Luigi Burroni and Anna Mori (Burroni, Mori and Bottalico 2020); the country report for Ireland has been elaborated by Liam Kneafsey and Aidan Regan (Regan and Kneafsey 2020); the country report for Spain has been elaborated by Alejandro Godino, Joel Martí and Óscar Molina (Molina and Godino 2020). All national reports are available at the NETWIR webpage: http://netw-ir.eu/reports/.

heavily regulated collective bargaining system, where statutory regulations define important aspects like the actors allowed to negotiate, the bargaining process, contents of collective agreements, conflict resolution procedures, extension of collective agreements, etc. At the other end of the spectrum, Ireland is a voluntarist industrial relations system with a minimum role for the state and virtually no statutory regulation of collective bargaining. In between, Italy would stand closer to the voluntarist model, though being an institutionally strong collective bargaining system whilst in the case of the Netherlands, there is stronger state support to collective bargaining.

In principle, we could expect a more important role for non-formalised interactions among actors involved in bargaining processes in those countries closer to voluntarist principles, as actors themselves define the rules, and as consequence the boundaries between formality and informality are blurred. However, this does not necessarily mean informality will play a less important role in heavily regulated IR systems. As a matter of fact, in these systems, informal relations may constitute an important resource in the hands of actors involved in the bargaining process to reach an agreement.

The structure of collective bargaining is another important dimension shaping the collective bargaining network. Again, the four cases included in the analysis represent different realities of collective bargaining structures. The predominant level of collective bargaining in Ireland since 2009 is company-level with a highly decentralised, local firm-level structure. In Italy, the Netherlands and Spain, multi-employer bargaining predominates, though with different roles for company level agreements within the bargaining system. In Italy, the bargaining system is based on a two-tier structure: national collective agreements (NCAs hereinafter) are negotiated at the sectoral level by national trade unions and employers' associations and are applied to all employees of the specific economic sector. This is then complemented with company level agreements. In the Netherlands, collective bargaining takes place mainly at the sector level and to a minor extent at the company level. In addition, an important share of the sector agreements is extended to the companies not part to the agreement by the Ministry of Employment and Social Affairs. Finally, in the case of Spain, sectoral collective bargaining predominates but with many companies also developing their own collective agreements. In this regard, we raise the hypothesis that networks in more centralized coordination systems tend to be denser and narrower compared to high-decentralised systems.

Mechanisms sustaining wage-setting coordination in the four countries are even more diverse than collective bargaining dimensions discussed previously. In the case of Spain, there is a centralized mechanism for cross-sectoral coordination through peak cross-sectoral agreements that set guidelines for wage increases in all sectors of the economy, including the public sector. In Italy, there is no cross-sectoral wage-setting coordination mechanism. In each sector, NCAs set the general conditions, including sectoral minimum wages, then complemented with company level bargaining. In the Netherlands the main locus for wage setting is also the sector, but some coordination of collective bargaining takes place at cross-sectoral level through the bi-partite Labour Foundation where workers and employers discuss about the labour market and labour relations, exchange information and communicate points of view to the government and to their own

members. Finally, there is little or no formal coordination in collective bargaining in Ireland since the economic crisis. However, a pattern has emerged in which a loose informal coordination has followed from strategic targeting and pattern-setting in sectors where unions have greater relative strength.

Pharmaceutical industry

The Pharmaceutical industry is a strategic sector for all countries considering its impact on public health and other manufacturing and service sectors, an importance that has increased in the context of the COVID-19 pandemic. The intensive research and scientific activity in this sector have its global epicentre in Europe (together with the US). In this regard, Germany is the first European Union member state exporter, followed by Belgium and Ireland. The four countries studied in the NETWIR project are within the 10 main exporter at EU level: Ireland (3rd), Netherlands (4th), Italy (6th) and Spain (8th) (Table 5), not including United Kingdom (third at European level with 30.318 € millions of exports).

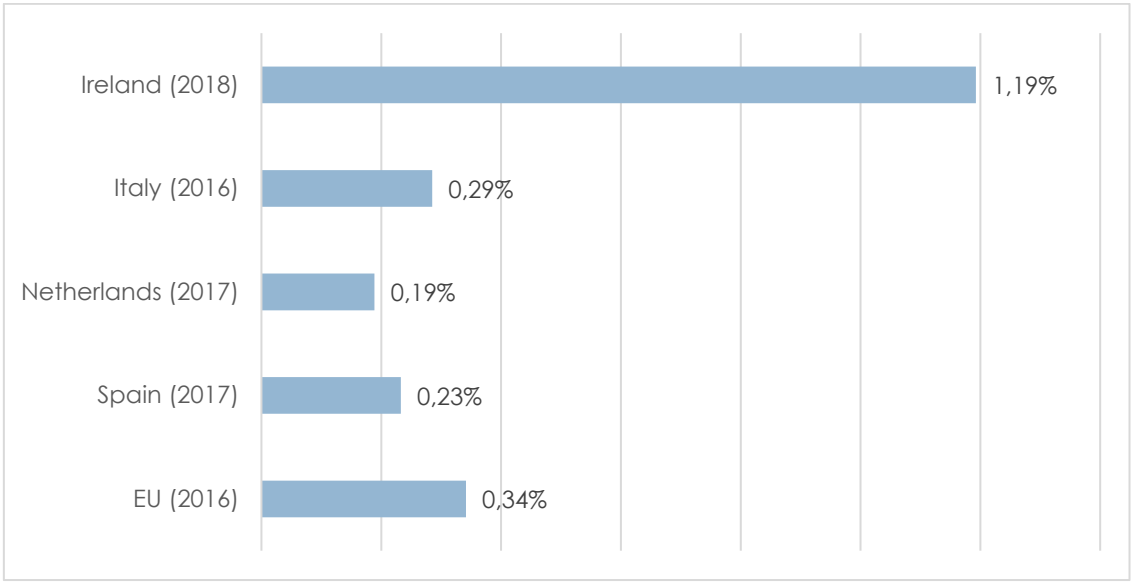
Table 5. Largest pharmaceutical export EU countries (€ Million).

	€ Million
Germany	69.513
Belgium	40.723
Ireland	30.169
Netherlands	28.495
France	28.271
Italy	20.524
Denmark	12.301
Spain	10.497
Austria	8.405
Sweden	7.308

Source: Eurostat (COMEXT database 2018)

Employment in the pharmaceutical sector in the EU was 219.000 employees in 2016, 0,34% of the total employment. The employment significance of the pharma sector is particularly important in Ireland where the 26.000 workers of the pharma sector represent 1,19% of its labour market. The sector is one of the main drivers of the Irish economy and employment, with all ten largest multinationals of the sector operating in the country. The pharma industry is also relevant in the other NETWIR countries, though not to the extent of the Irish case (Graph 1). Even though, these countries count with many indirect jobs in the sector (i.e. Spain with 160 thousand indirect jobs (Farmaindustria 2018)).

Graph 1. Share of pharmaceutical industry workers in NETWIR countries and the EU.



Source: EFPIA member associations; INE active labour survey (2019), Central Bank of Ireland, (2019) and Statline (2019).

Overall, the pharmaceutical sector workforce is highly skilled (more than 90% of higher education workers in Italy, 65% in Ireland and 62% in Spain, always higher than national average). Working and employment conditions are better than average for the economy (higher salaries, higher rates of permanent and full-time contracts, etc.). The participation of women is diverse across counties: while Spanish pharmaceutical industry has 52% of women workers (higher than in others industrial activities), Dutch participation of women in pharma is 40%.

Collective Bargaining Networks in the Pharma Industry

Notwithstanding being a small sector from the point of view of total employment, collective bargaining in the pharma sector plays a key role for bargaining processes in other sectors in all the countries analysed. Industrial relations in the pharmaceutical industry are characterised in most cases by being largely cooperative thanks to the predominance of large companies, good working conditions and high productivity levels in the sector. However, these cooperative relations occur in different institutional contexts where social partners have diverse resources and capacities. The analysis of bargaining networks in the Pharmaceutical sector reveals two clearly differentiated patterns in the four countries analysed.

In the case of Ireland and the Netherlands, collective bargaining in the Pharma sector takes place at company level. In the two countries, there is a strong transnational dimension, as the mother multinational company plays a key role in setting wages or at least, setting a target for pay increases. Even though the two countries lack a sectoral level

of coordination, they have nonetheless developed alternative mechanisms for coordination that are functional alternatives to an explicit sector-wide form of coordination.

In the case of Ireland, the analysis reveals three elements underpinning wage coordination in the sector. First, pay norms in the German chemicals industry and broader German economy as key to the goal-setting. Second, a key role for trade unions, and in particular SIPTU, in spreading the 2% pay norm between companies through a tight network of individuals (Regan and Kneafsey 2020). Finally, the analysis of the pharma sector for the Irish case also highlights the importance of informal links and personal relationships between union officials, HR managers in major 'pattern-setting' firms, and employer representative bodies and/or consultancies in the development and implementation of a strategy broadly characterised as 'pattern bargaining'.

In the Dutch case, the transnational dimension also emerges as central to collective bargaining dynamics as the bargaining process is conditioned one way or the other by the mother company, therefore leaving limited room for the Dutch daughter company. However, contrary to the case of Ireland, fragmentation on the trade union side has been pointed out as an obstacle for coordination. As a matter of fact, the employer organization AWVN seems to play a coordination role in supporting companies through information provision or being involved in negotiation rounds (Been and Keune 2020).

In Italy and Spain, collective bargaining in the Pharma sector is based on sectoral coordination processes of the chemical-pharmaceutical activities and characterised by cooperative relations between unions and employers. Moreover, in the two countries the chemical-pharmaceutical collective agreement constitutes a reference for other sectors due to its innovative character.

Table 6. Characteristics of pharma survey respondents.

		Ireland	Italy	Netherlands	Spain
Side	Employer	2	4	11	18
	Union	7	6	18	10
Main role during bargaining	Political	0	5	18	15
	Technical	9	5	1	12
	Union member	0	0	10	0
Sex	Female	2	1	8	9
	Male	7	9	21	19

Source: NETWIR survey

Whilst sectoral characteristics certainly contribute to maintain consensus and cooperation between unions and employers, there are other mechanisms supporting cooperative relations. In the case of Italy, a relatively small network made up of 16 actors belonging to three largest trade union confederations and the two employer organisations (10 out of these 16 responding to the survey) (Table 6), facilitate intra and inter-organizational coordination. Moreover, the bargaining network is rather stable, as actors have been

involved in collective bargaining in the sector for many years, therefore contributing to high level of trust.

The bargaining network in the Spanish case is larger compared to the Italian one, with almost 50 actors involved (28 responding to the survey) and similarly to the Italian case, most actors have a longstanding relation in collective bargaining in the sector. The analysis in Spain has revealed a more important role for informal interactions during the bargaining process. As a matter of fact, informal multilateral events are considered the most relevant form of interaction after the formal multilateral ones in the case of Pharma in Spain. Particularly important are intra-organizational informal events in the case of employers, that serve to discuss main issues previous bargaining negotiations. That is the case of the so-called "days of coexistence" in which members of the FEIQUE team, sub-sectoral, professional and/or territorial partner associations hold informal a pre-negotiation event for days. But there are also informal events gathering unions and employers during the negotiation final stage to solve the final obstacles for signing a collective agreement. Both employers and unions attach a key role to the so-called "Reduced Commission" in the final phase of the negotiation (prior to the drafting commission) in which two or three members of each organization hold two or three meetings to unblock certain aspects of the negotiation. The relevance of this event lies in its formal call while its development is informal (that is, official but without minutes). Members of the commission are required to negotiate without previous positions of the organizations, developing the meetings in an open, without conflict and in trust environment, all with a single goal: to find solutions to the demands of each organization. In other words, the negotiation process uses informal mechanisms in a formal event for the success of the negotiation.

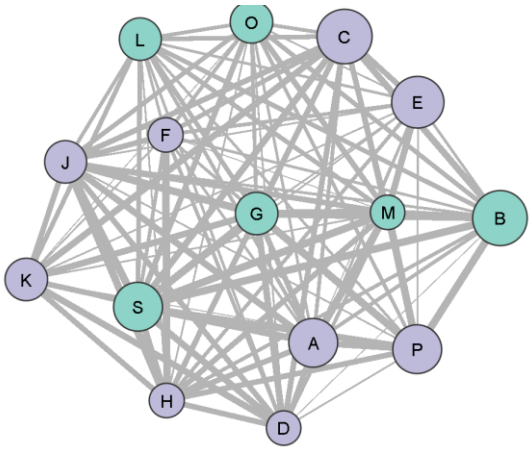
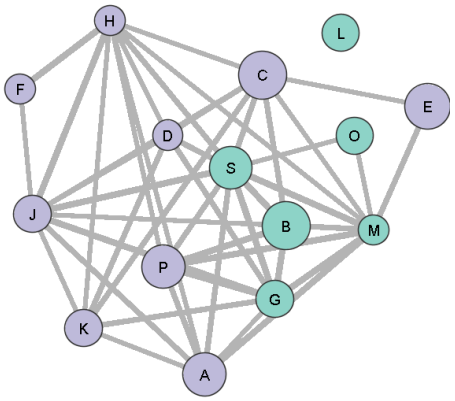
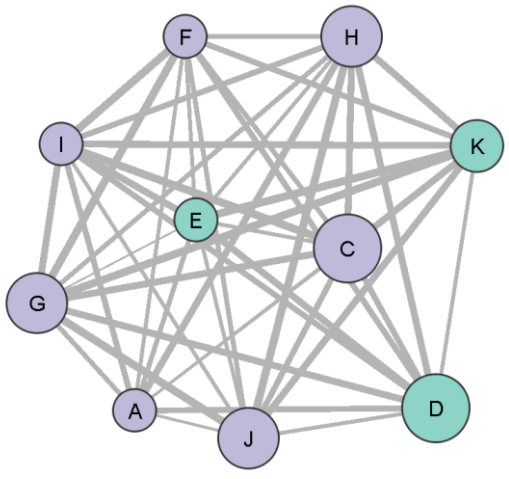
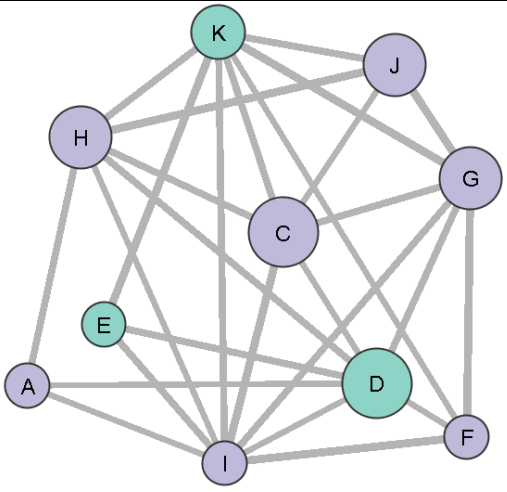
In the countries with more decentralized bargaining systems in Pharma, lack of trust is a major issue when it comes to the problems to achieve coordination of collective bargaining (Ireland and the Netherlands). On the contrary, in Italy and Spain, where sectoral collective bargaining predominates, lack of trust is the less important aspect to achieve coordination. This is probably explained by the long record of participation in collective bargaining of those surveyed.

As we could expect, in those countries where company level bargaining prevails, pattern setters are other companies. However, whilst in the Dutch case there is a reduced number of large multinationals considered pattern setters for the other companies, it is more fragmented in the case of Ireland, with up to nine companies labelled as influential by those surveyed. By contrast, in the countries with sectoral bargaining, no firm has been mentioned as pattern setter. In the case of Italy, the manufacturing sector is regarded a main pattern setter for sectoral collective bargaining in the pharma industry, whilst in the case of Spain, the interviews reveal how the chemical-pharma collective bargaining is actually considered a pattern setter in other sectors, therefore explaining why no sector has been pointed out as pattern setter.

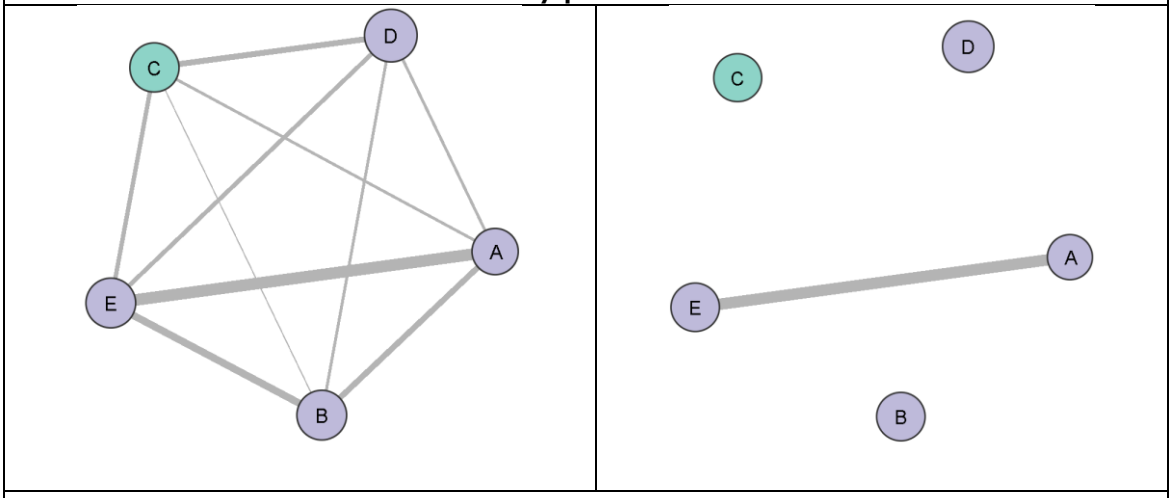
Contact Networks in the Pharma Industry

The differences in network size, response rate and low number of employers present in the survey makes it difficult to compare contact networks across all countries in the pharma sector. As has been already reported in the country reports of Italy and Ireland, the low response rate, particularly among employers, is explained by the distrust and lack of interest on the potential benefits of SNA analysis. However, the response rate in the Netherlands and Spain for the pharma sector is relatively high thus allowing to compare contact networks in the two countries.

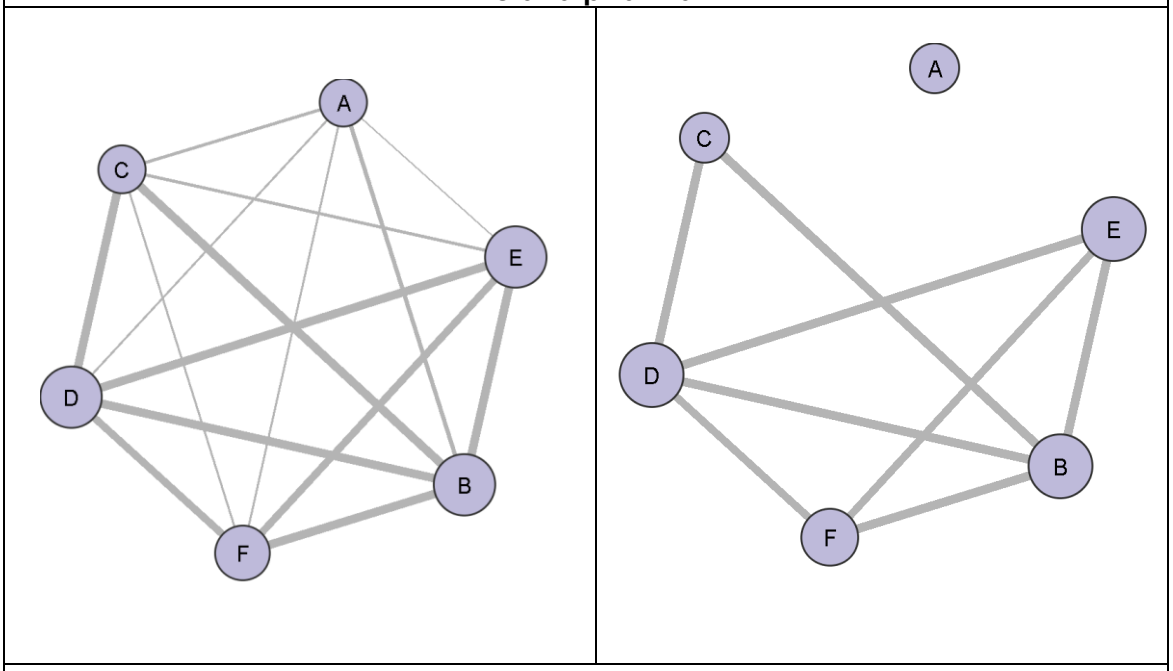
Graph 2. Contact Networks in the Pharma Industry

Column A: all frequencies of contact are included	Column B: links ≤5 have been removed for better visual interpretation (scale from 0=never to 8=very frequently)
Netherlands Pharma 1	
	
Netherlands Pharma 2	
	

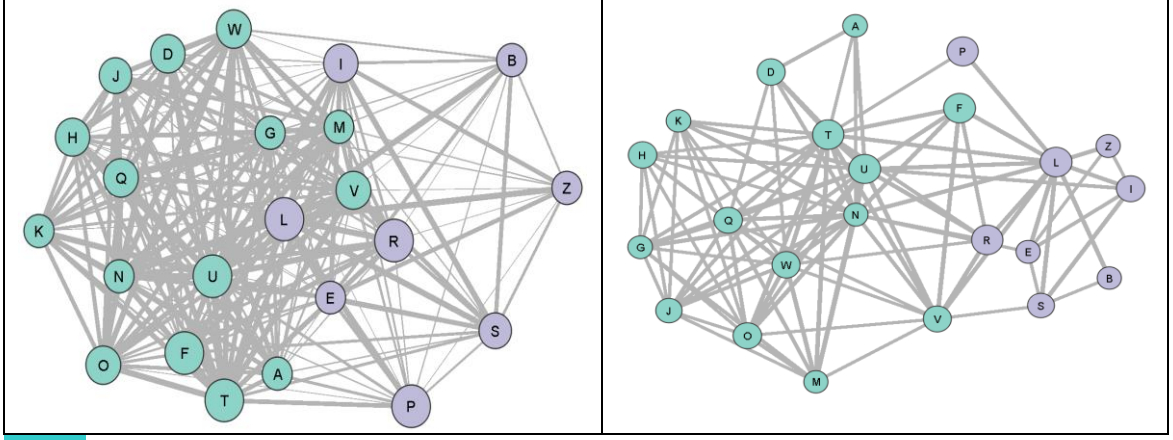
Italy pharma



Ireland pharma



Spain pharma



Employer
Trade union

Source: NETWIR survey

Note: Actors have been anonymised and assigned letters randomly.

Table 7. General descriptors of the contact networks in the pharma sector.

	Italy	Netherlands 1	Netherlands 2	Spain
Density	1,000	0,990	1,000	0,846
Degree centralization	0,000	0,011	0,000	0,169
Weighted degree variance	0,715	0,570	0,355	0,837
Average tie strength (total)	3,4	4,75	5,78	4,13
Average tie strength (within employers)	-	6,13	6,33	6,08
Average tie strength (within unions)	4,000	4,64	5,95	5,04
Average tie strength (between employers and unions)	2,500	4,44	5,52	2,23

Source: NETWIR survey

When comparing the characteristics of contact networks in the pharma sector of the Netherlands and Spain, some interesting features come out (See Graph 2 and Table 7). First, the bargaining network of pharma in Spain is more centralized compared to the ones in the Netherlands. The decentralized character of collective bargaining in the Dutch case suggests more dispersed power in the network and high density of relations, whilst the sectoral pattern of negotiations in Spain is conducive to a concentration of power in few actors in the network whose representatives in the bargaining process are in charge of reaching and signing an agreement. This is consistent with a higher density of relations in pharma in the Netherlands compared to Spain; when power is more dispersed, influence and trust can only be achieved by maintaining contacts with all the actors in the network. In a situation of concentration of power, where organizational hierarchy is important, density of relations tends to be lower as trust and influence is achieved through other means.

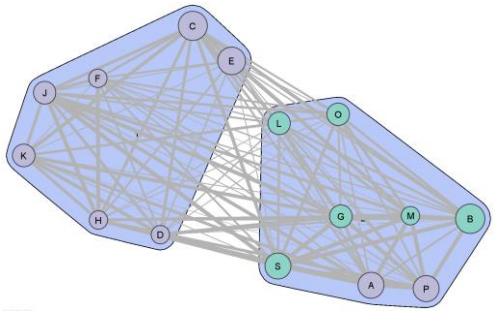
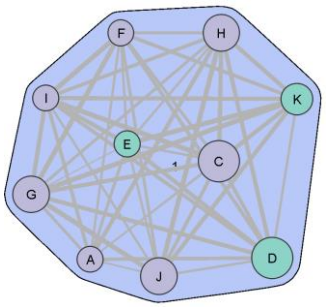
Inter-organizational coordination in Spain (approached through average tie strength between unions and employers in table 7) is significantly lower to the case of the Netherlands. By contrast, intra-organizational coordination in Spain (approached through average tie strength between members of the same union or employer organisation) is higher. This points to the importance of hierarchies in collective bargaining in Spain, where intra-organizational coordination plays a more important role. In the case of the Netherlands, intra and inter-organizational coordination seem to be equally important in bargaining networks.

The analysis of some synthetic indicators of centrality in contact networks is also illustrative of the above differences. The results for Spain show a pattern where employers are the actors with the highest number of links (top degree centrality)[4], whilst in the case of those actors who influence the flow around the system (betweenness) there are both employers and unions. Finally, there is closeness centrality, an indicator that shows how close a node is to all other nodes in the network, and also in this case, both unions and employers have actors with top closeness.

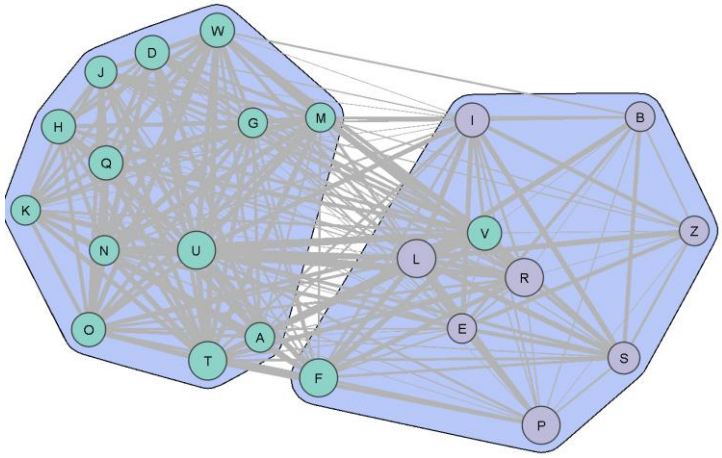
[4] The degree centrality measure finds nodes with the highest number of links to other nodes in the network.

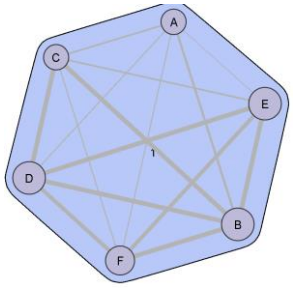
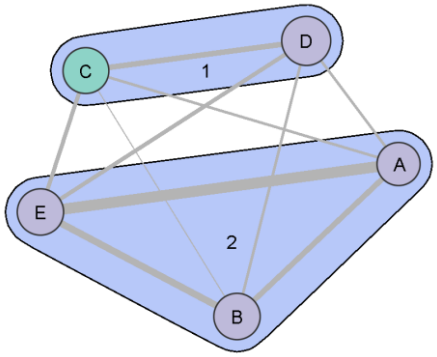
In the case of the Netherlands, there is no clear prevalence of unions or employers on any of the abovementioned centrality indicators, as actors from both sides appear to be high in the scale. It is nonetheless interesting to note the lack of direct correspondence between centrality indicators and the most influential actors in any of the two countries, except for Pharma (2) in the Netherlands. Several explanations could be given to this fact. First, it shows that a more active and central role in the collective bargaining network does not necessarily means more influence. In other words, relational power (measured by centrality measures) acquired in the network does not necessarily translates into more capacity to influence outcomes. A reason for this could be the different roles of actors in the network; technical actors would be more active in the network in order to solve technical issues, whilst those actors with a political profile would only participate in the final stages of the bargaining process in order to sign the agreement and would accordingly score low in centrality measures.

Graph 3. Communities (subgroups) in the contact networks of Pharma.

Netherlands Pharma 1	Netherlands Pharma 2
	

Spain pharma



Ireland pharma	Italy pharma
	

Employer
Trade union
Source: NETWIR survey
Note 1: Actors have been anonymised and assigned letters randomly.
Note 2: Subgroups within the network have been computed based on Louvain clustering with edge weighting

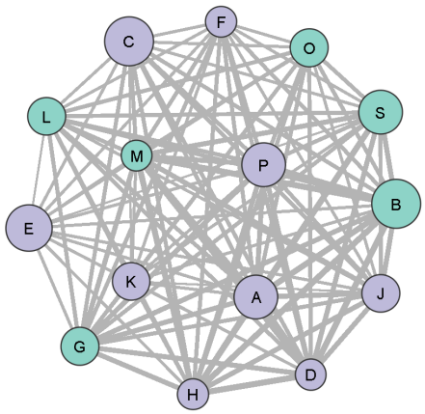
The analysis of subgroups within the bargaining network for the two countries with higher response rate (the Netherlands and Spain) shows some interesting similarities, but also relevant differences. First, in both countries the strength of ties in the employer side is higher compared to unions. This points to more intra-organisational coordination on the employer side. Moreover, in the case of Spain, employers and unions form two clearly differentiated subgroups, though with two employers maintaining stronger contacts with unions. The stronger role for organisational hierarchies in a more centralised bargaining system makes ties within unions and employers more important. But at the same time, some key actors within employers will have a closer relationship with trade unions, especially in the final stages of negotiation of a collective agreement. A similar but reversed pattern can be observed in Pharma (1) in the Netherlands, where two subgroups also exist, though in this case two union representatives have closer relations with the employer subgroup (Graph 3).

Co-attendance networks in the Pharma industry

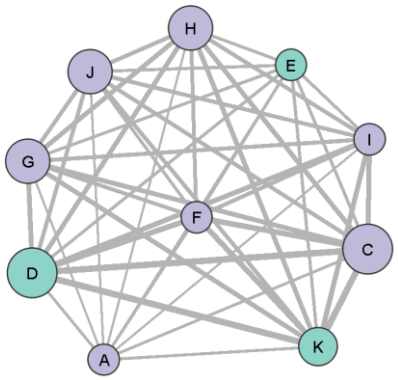
While contact networks report information on direct, interpersonal relationships among actors in wage setting processes, co-attendance networks report whether every pair of actors are close because they attended the same type of events. Because any pair of actors can keep in touch outside of the wage setting events, these two data (frequency of contact and event co-attendance) provide different information on the network. Graphs 4 and 5 display sociograms for complete co-attendance networks and simplified co-attendance networks respectively.

Graph 4. Co-attendance networks from affiliation data (complete view, weighted data)

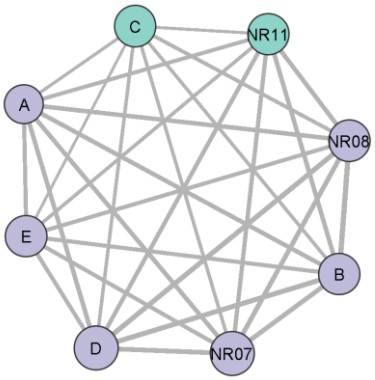
Netherlands Pharma 1



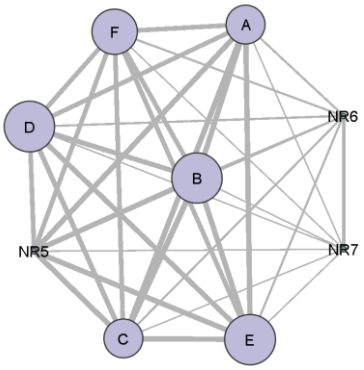
Netherlands Pharma 2



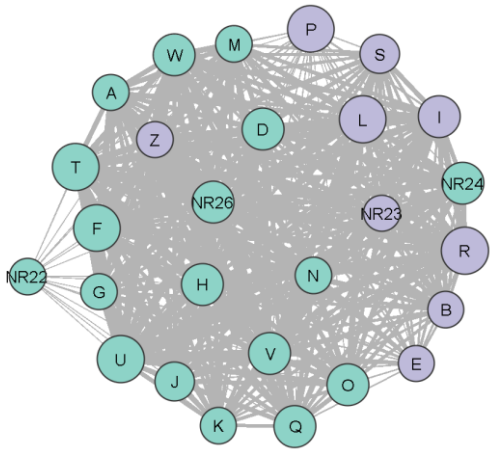
Italy pharma



Ireland pharma



Spain pharma



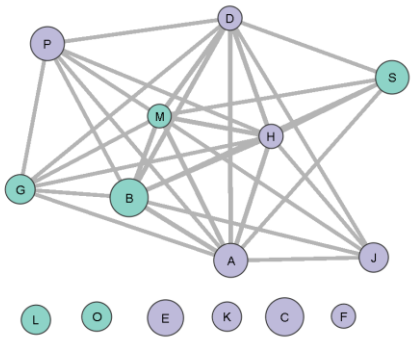
Employer
Trade union

Source: NETWIR survey

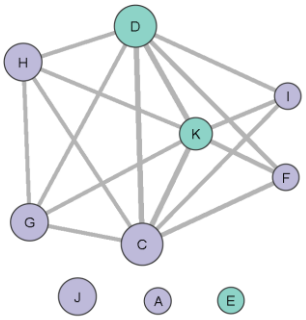
Note 1: Actors have been anonymised and assigned letters randomly.

Graph 5. Co-attendance networks from affiliation data (reduced view, simplified & binary data)

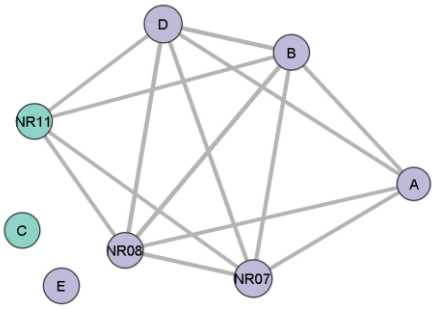
Netherlands Pharma 1



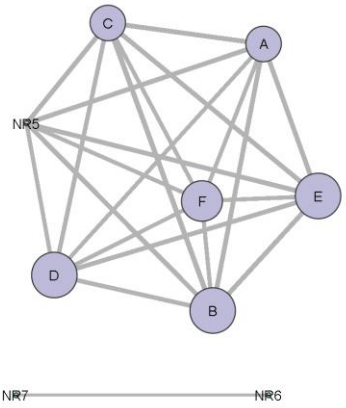
Netherlands Pharma 2



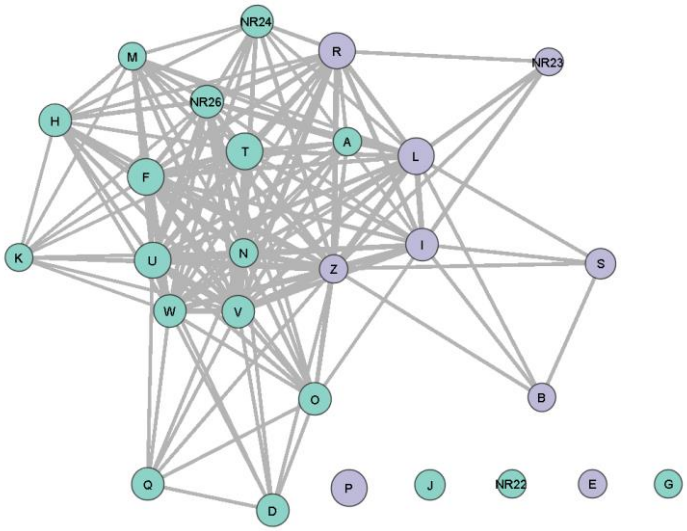
Italy Pharma



Ireland pharma



Spain pharma



Employer

Trade union
Source: NETWIR survey
Note 1: Actors have been anonymised and assigned letters randomly.

Table 8. Characteristics of Co-Attendance Networks in the Pharma Sector

	Ireland	Italy	Netherlands 1	Netherlands 2	Spain
Network Size	9	8	10	15	27
Number of Links (weighted by contact frequency)	36	28	45	105	342
Top event attenders	D G	NR8 B D	C K D	D A H M B	Z R V U
Actors with top degree (weighted)	D G E K L A	NR08 B D NR07	C K D	D A H M B	Z V U N
Actors with top betweenness (weighted)					Z V U N
Actors with top closeness (weighted)	All	All	All	All	All
Most influent actors (perceived influence)	G H K	D C E B	C D	C B E	L R U T F P

Source: NETWIR survey.
Note: Actors have been anonymised and assigned letters randomly.

The analysis of affiliation or co-attendance networks in the pharma industry confirms some of the results already showed for contact networks (See graph 5 and table 8). First, there is no clear correspondence between event attendance and influence, thus confirming the importance of the division of roles between political and technical actors in the network. Put differently, the hierarchies within the actors involved in the negotiation are clearly set and ex ante and the bargaining process does not significantly alter this situation. Secondly, there is no prevalence of either employers or unions when it comes centrality measures of co-attendance networks; participation in the events is similar for the two actors.

The Retail Sector

The retail is a strategic sector in the European economy, not only because of the size and employment it generates, but also because it is a good mirror for the great changes that are taking place in the global economy: the sector is experiencing structural changes, with processes of concentration and diversification, and pressures for restructuring, deregulation and reduction of employment. Many analysts in the last years coined the concept of "retail apocalypse", namely the retail closures produced by the rise of e-commerce (Burroni, Mori and Botalico 2020), together with other changes as outsourcing dynamics in the supply chain and the automation of certain processes. The retail sector

presents sharp differences between retailers, depending mostly on the competitive strategies of firms and the sub-sector within which they operate. Although the sector is traditionally dominated by SMEs (Table 9), large companies are increasing.

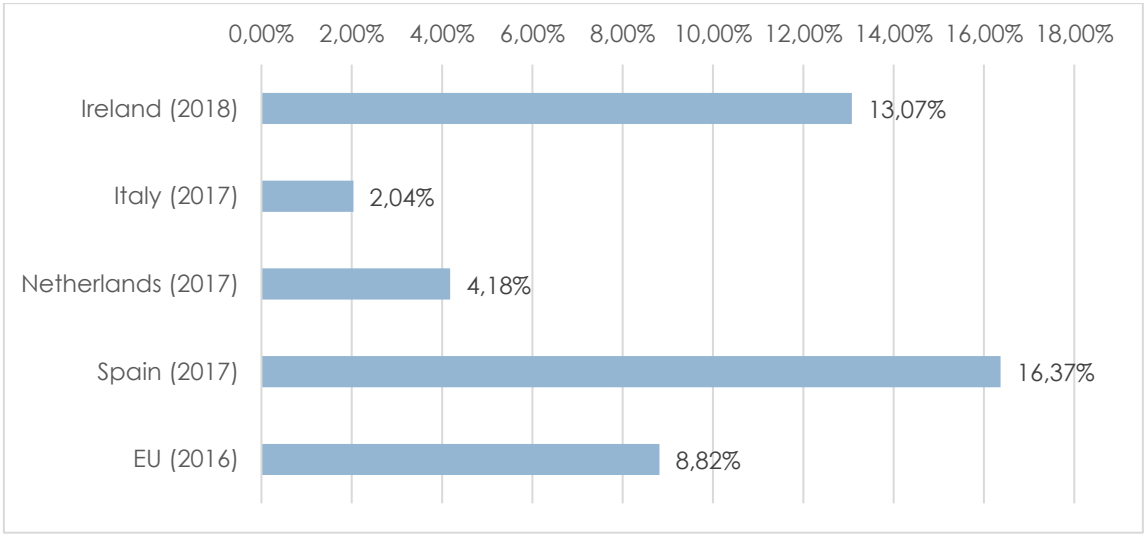
Table 9. Company size of the European retail sector.

Companies by size-class in 1000	N	Share
Micro (<10 employees)	5046	93,4%
Small	309	5,7%
Medium	39	0,7%
Large	7	0,1%
Total	5401	100,0%

Source: Eurocommerce (Source: Eurostat 2016).

Furthermore, retail is an extremely important and heterogeneous sector in the EU: around 25% of European companies are within the sector (with a 93,4% of micro enterprises) and around 19,3 million of workers across Europe (8,82% of the European workforce) (Eurocommerce 2016), just after the manufacturing sector (Eurocommerce and UNI europa global union 2017). The employment generated within the sector is particularly important in Spain (16,37%) and Ireland (13,07%) (Graph 6). Moreover, retail is a labour-intensive sector with low wages and with a pay gap between women and men and higher rates of temporary contracts.

Graph 6. Share of Retail workers in total employment.



Source: Eurocommerce (2016), INE active labour survey (2019), Central Bank of Ireland, (2019), Federdistribuzione (2017) and Statline (2019).

Collective bargaining networks in the Retail Sector

The analysis of collective bargaining in the retail sector in the four countries studied in the NETWIR project reveals the prevalence of multi-employer bargaining in all countries, except Ireland. Another characteristic common to all countries is a higher fragmentation in interest representation, both in the union and the employer, compared to the pharma industry.

Ireland is the only country where there is no form of multi-employer bargaining nor coordination. The lack of organisational capacity and power resources among the key unions has resulted in an absence of coordinated strategy in pay bargaining and engagement with employers. Unions have generally poor and somewhat conflictual relations with employers and rely to a significant extent on social movement and campaigning tactics rather than the type of cohesive, centrally-devised wage strategy and implementation as in the case of SIPTU in Pharmaceuticals above. It is therefore difficult to mobilise responsiveness and to identify the operation of any coherent network and coordination between actors. Absent union coordination, there is little if any coordination to speak of. Fundamentally, there is a deeply fragmented and atomised structure to negotiations in the sector. Employers in Retail in many cases have conflictual relations with the unions and are often based primarily in the United Kingdom, limiting the scope for organisation and inter-employer communication further. In the other countries included in the research, sectoral coordination of collective bargaining exists, though with differences in the mechanisms underpinning coordination and the forms and degree of social partners fragmentation.

In Italy, fragmentation is particularly important on the employer side. Even though there is one sectoral level collective agreement signed including the largest trade unions and employers in the sector, this fragmentation has led to the appearance of so-called pirate agreements[5]. As a mechanism to fight against these strategies, trade unions have developed strong intra-organisational forms of coordination. There is coincidence among the actors surveyed around the importance of other collective agreements on wage-setting practices in the retail sector. More specifically, they agree in pointing out to the Tourism and Hospitality sector as a particularly important reference for collective bargaining in retail.

[5] These are agreements signed by small, usually non-representative trade unions and employer associations. Specifically, these agreements negotiate downwards and erode working conditions with the aim of undermining working standards set in existing collective agreements at company or sector level. As such, pirate collective agreements are an instrument for social dumping in collective bargaining.

Table 10. Relevance of challenges for coordinating in the Retail Sector (Scale of five, 1=Irrelevant, 5= Extremely relevant).

	Lack of trust	Power differences	Fragmentation in the representation of workers or firms	Obstacles from economic and/or sectorial context
Ireland	3,44	3,22	2,56	4,22
Italy	2,38	2,63	3,13	3,63
Netherlands	3,00	2,93	3,18	2,39
Spain	2,50	2,70	2,75	4,14
Total	2,79	2,85	2,93	3,42

Source: NETWIR survey

In the Netherlands there are two sectoral level collective agreements in the supermarket sector: the VGL collective agreement for the big players in the field and the Supermarkets collective agreement for small and medium enterprises (i.e. all others). Both collective agreements are negotiated at the same table and they are identical except for pension schemes and early pension arrangements. The supermarket agreement is legally extended to the sector. Because the negotiation process takes place at the sectoral level, the predominant form of wage-setting in the activity is the sectoral level. However, in the collective bargaining process, actors surveyed have pointed out to a number of retail companies as particularly important in setting a pattern for negotiations.

Finally, collective bargaining in the retail trade sector in Spain is also dualized along company size. Whilst large retailers have their own sectoral collective agreement at national level, small retailers and other activities within the retail trade sector develop collective bargaining at several levels. Thus, the Spanish retail trade sector is characterized by a high number of sectoral agreements, signed for each subsector and changing in relation to the territorial coverage national, regional or provincial. The analysis has been carried out for the large retail sector.

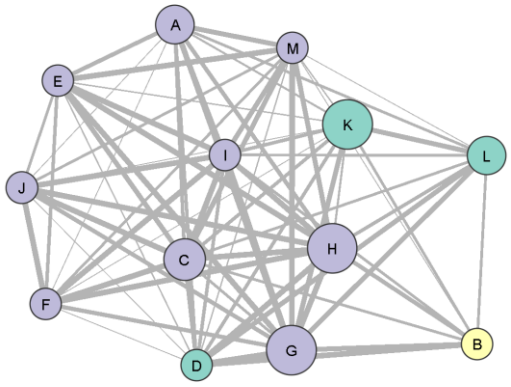
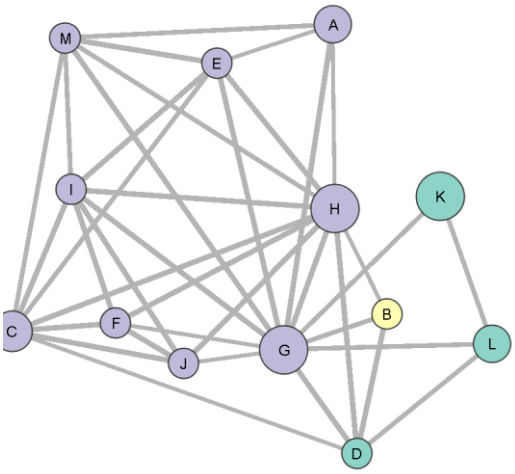
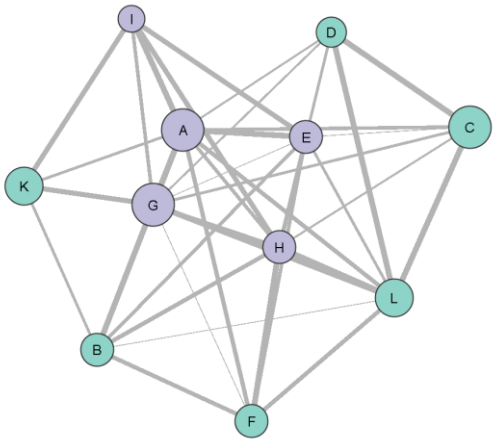
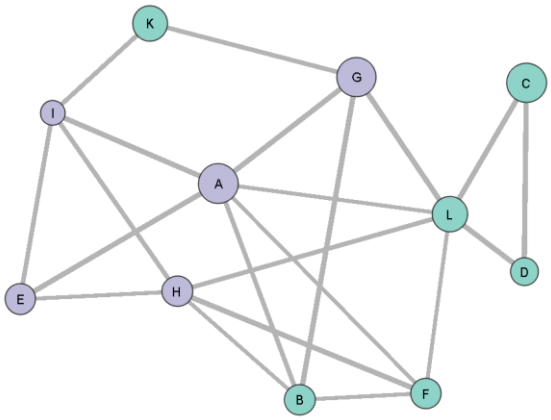
Fragmentation of interest representation and sectoral characteristics (together with other sectoral characteristics like higher company size, high skills and productivity levels etc.) contribute to explain the more conflictual relations that characterise the retail sector compared to Pharma. The results show for all countries, except the Netherlands, the main challenge for coordination between unions and employers is the sectoral context together with the fragmentation of interest representation (See Table 10).

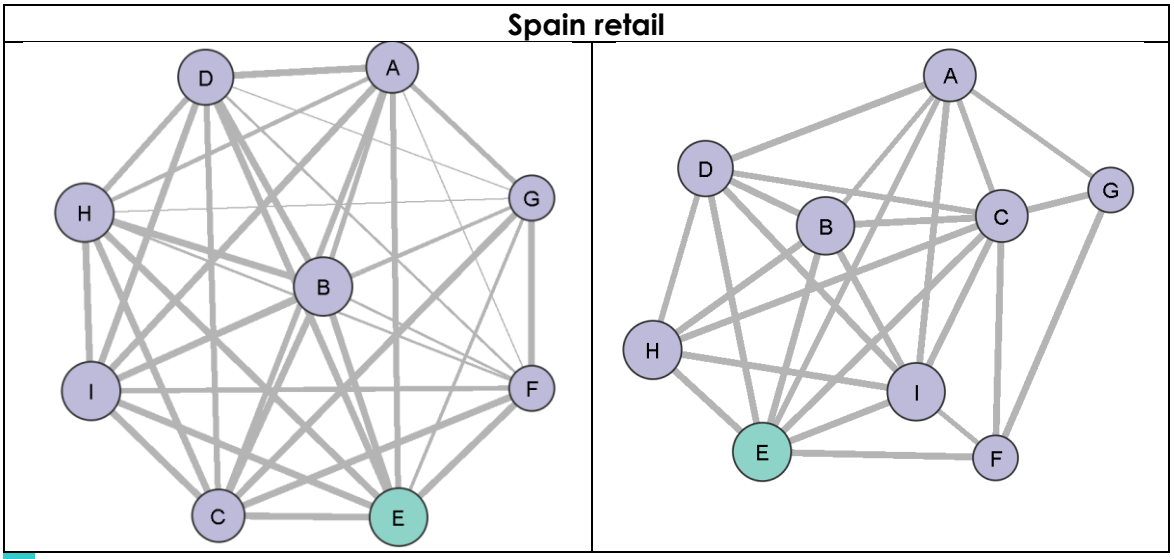
Contact Networks in the Retail Sector

The differences in network size, response rate and low number of employers present in the survey makes it difficult to compare contact networks across all countries in the retail sector. As has been already reported in the country reports of Ireland, no answers to the survey have been obtained from either employers or trade unions in the retail sector.

Moreover, similarly to what has been mentioned in the case of Pharma, there is a lower response rate in the case of employers. However, as the response rate for those with higher perceived influence in the network is 60% in the Netherlands, 83% in Italy and 89% in Spain, a comparative analysis of the three cases has been made.

Graph 7. Contact Networks in the Retail Sector

Column A: all frequencies of contact are included	Column B: links ≤5 have been removed for better visual interpretation (scale from 0=never to 8=very frequently)
Netherlands retail	
	
Italy retail	
	



Source: NETWIR survey

Note 1: Actors have been anonymised and assigned letters randomly.

The analysis of contact networks in the three countries where network data is available shows very different patterns. Spain emerges as the case where employers are less represented in the network. This is explained to some extent by the monopoly of employer representation in Spain compared to the fragmentation existing in the other countries, being Italy a case in point (see graph 7). As a matter of fact, in Italy and the Netherlands, average tie strength within employers is lower compared to unions (see table 11).

Trade unions are the actors with higher centrality scores in the bargaining networks of the Netherlands and Italy. In the Dutch case, it is also clear how within trade unions there are some actors that act as bridges with employers, and those are precisely the nodes with the highest betweenness centrality score. A similar pattern can be observed in the case of Italy, though with a lower density of relations. The shape of the two networks reflects different, but important role for trade unions as coordinators of collective bargaining in this sector; in the Dutch case, those trade unions with the highest centrality score, bridge the relationship between employers and other less important trade union. In the Italian case, those trade union actors which are more central actually connect and serve as shortcuts to link with employers in the network. That explains why those actors with the highest centrality score are also those with the higher betweenness, showing those actors who have more influence on flows in the network.

A different pattern can be observed in the Spanish case due to the predominantly union-based network. As has been pointed in the NETWIR Country Report for Spain, after many years of conflictual relations in the union side, for the first a time a collective agreement bringing together all trade unions represented in the sector was possible. The interviews revealed a particularly important role for intra-union coordination and trust building, something that was achieved through a) a high density of relations and, b)

notwithstanding differences on union size, avoiding any hierarchy on the union side and attaching all trade unions the same role in negotiations.

Table 11. General descriptors of the contact networks in the retail sector.

	Italy	Netherlands	Spain
Density	0,727	0,910	1,000
Degree centralization	0,333	0,106	0,000
Weighted degree variance	1,231	1,447	1,039
Average tie strength (total)	3,970	4,940	6,250
Average tie strength (within employers)	2,730	6,330	-
Average tie strength (within unions)	6,000	6,560	5,930
Average tie strength (between employers and unions)	3,830	3,410	7,380

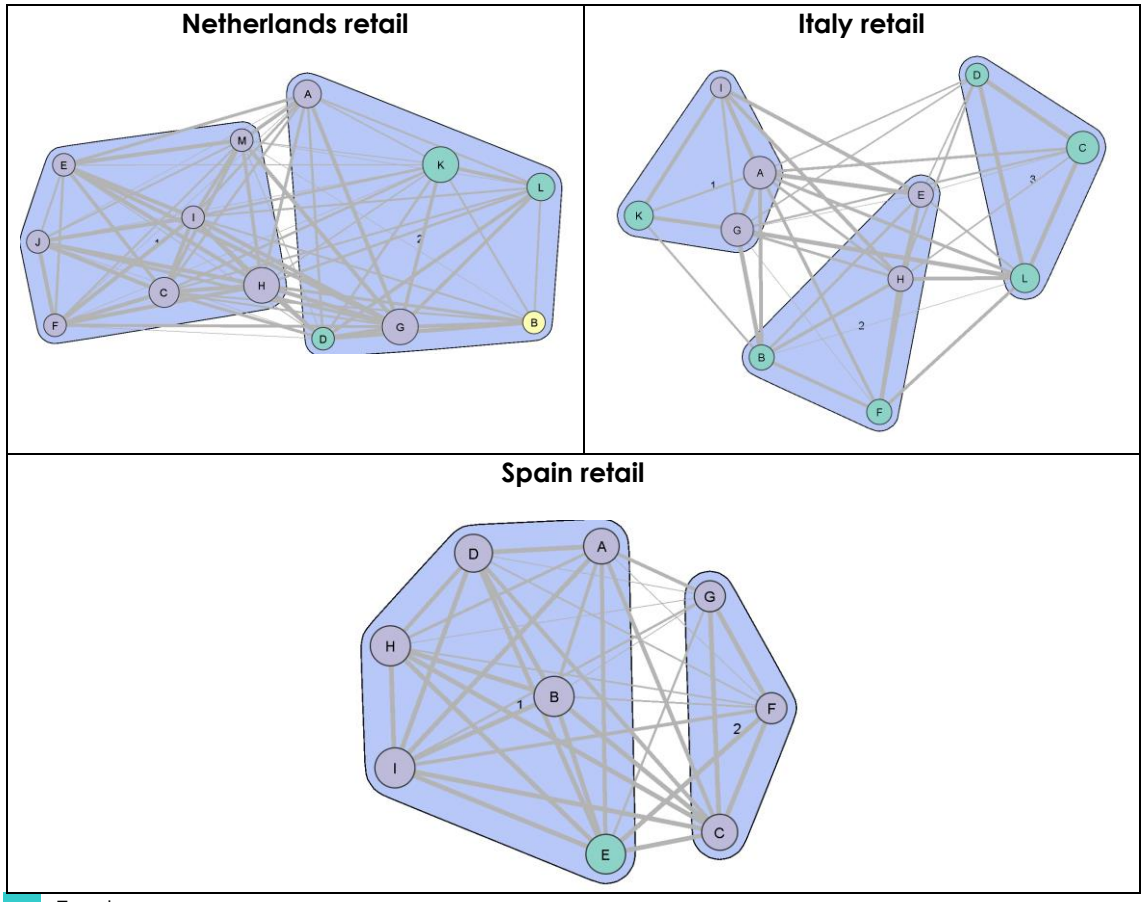
Source: NETWIR survey

The differences in networks are confirmed by the synthetic indicators showed in table 11. The contact network in Spain has a density of 1, meaning that every actor is tied to each other, whilst it is lower for the case of Italy and to a lesser extent in the Netherlands. At the same time, a high density mirrors into a low degree of centralization of the bargaining network; it reaches 0 in the case of Spain, meaning that all actors have the same centrality (importance / role) in the network, and is higher in the case of Italy.

Intra and inter-organizational dynamics are different across the four countries compared. As previously pointed out, in all retail bargaining networks, unions play a key role, though in different ways. Because of this, average tie strength within unions is very high in the three countries. On the employer side, this indicator is also high in the Netherlands, but very low in Italy. This is consistent with the evidence presented in the NETWIR Italian Country Report, where it is showed a high degree of fragmentation on the employer side, which would result in low intra-organizational coordination for employers.

When it comes to inter-organizational coordination, the above analysis suggests a more important role in Spain which is confirmed by the high average tie strength indicator between unions and employers, two times higher than Italy and the Netherlands.

Graph 8: Communities (subgroups) in the contact network



Source: NETWIR survey

Note 1: Actors have been anonymised and assigned letters randomly.

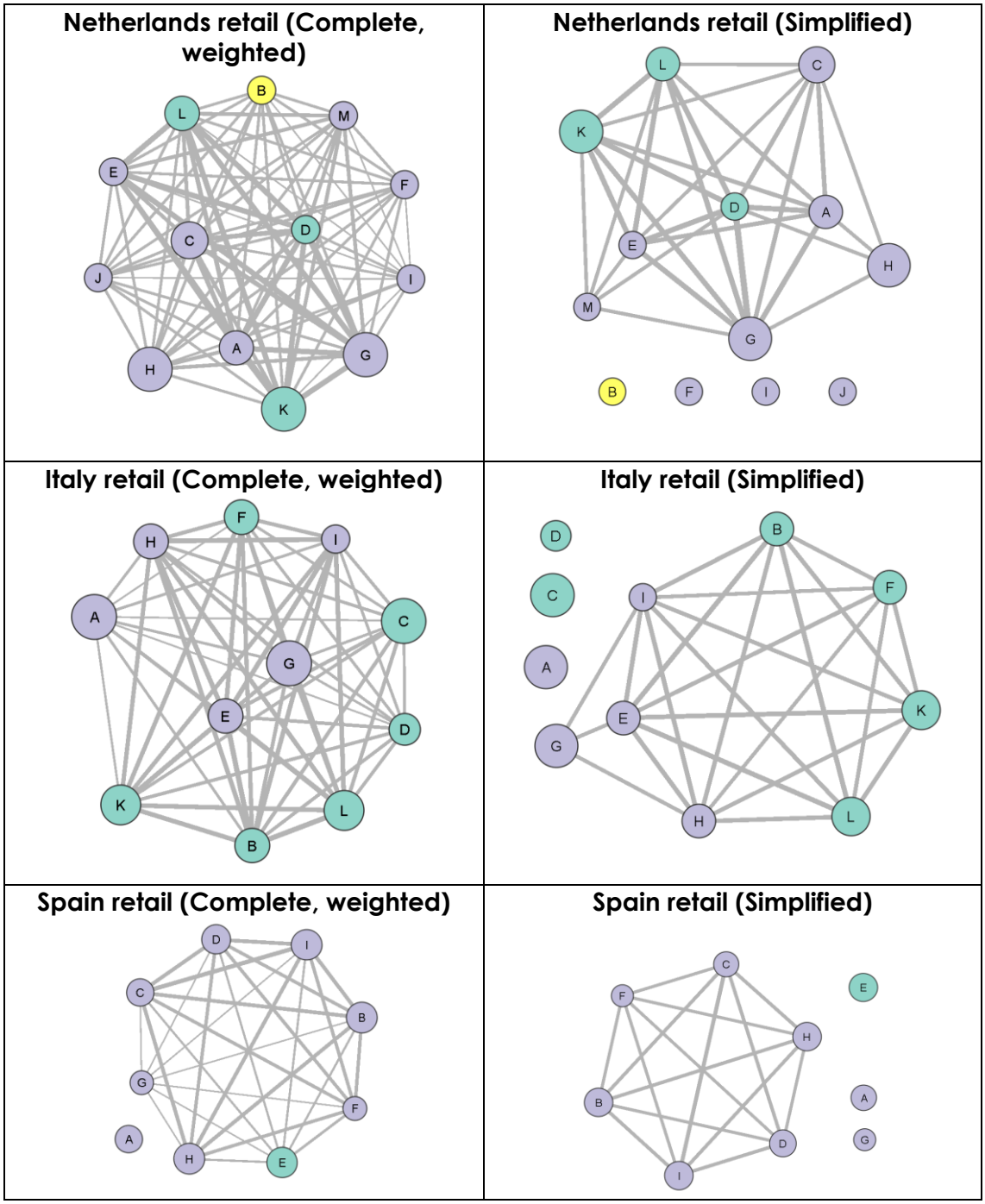
Note 2: Subgroups within the network have been computed based on Louvain clustering with edge weighting (http://visone.info/wiki/index.php/Louvain_Clustering)

Cross-country differences in the role of inter and intra-organizational coordination can also be visualized in the communities or sub-groups computed in the contact networks of the three countries (see Graph 8). The sociogram for Italy shows the fragmentation that characterises interest representation in the retail sector, with three subgroups: one composed of employers and two with trade unions and employers with some distance between them. In the Dutch case, a trade union and an employer (though with some unions) subgroup have been identified, but compared to Italy, the gap between the two is narrower thus suggesting a less fragmentation. Finally, results in Spain are line with findings coming from qualitative analysis and reported in the NETWIR country report for Spain (Molina and Godino 2020). There it was clear a division on the trade union side between the largest and most representatives trade unions in the sector and the others. The two subgroups thus reflect this division in the bargaining network.

Co-attendance networks in the Retail Sector

Co-attendance networks provide information about event attendance therefore providing complementary information to contact networks. Graph 9 contains sociograms for complete and simplified co-attendance networks in the three countries where survey data has been collected.

Graph 9. Co-attendance networks from affiliation data. Complete view (weighted data) and reduced view (simplified & binary data)



Employer
Trade union
Independent chair
Source: NETWIR survey
Note 1: Actors have been anonymised and assigned letters randomly.

Table 12. Characteristics of Co-Attendance Networks in the Retail Sector

	Italy	Netherlands	Spain
Network Size	11	13	9
Number of Links (weighted by contact frequency)	55	78	28
Top event attenders	E I	DG	I C
Actors with top degree (weighted)	E B L	D GEKLA	I C H B
Actors with top betweenness (weighted)			
Actors with top closeness (weighted)	All	All	All except A
Most influent actors (perceived influence)	G A C	GHK	E H B I

Source: NETWIR survey.
Note: Actors have been anonymised and assigned letters randomly.

The results for the retail sector show first of all how those with a higher centrality score in the co-attendance network are in all countries the top event attenders plus other actors. This means that attending events is a sufficient condition for being central in the network, but not a necessary one. Secondly, there is a lack of correspondence between perceived influence and top event attenders (See Graph 9 and Table 12). One possible explanation to this fact would be the existence of a clear division of roles between those actors with a more technical profile who attend most of the events in the bargaining process, and those with a more political role, whose involvement in the bargaining process is limited to the early (setting the agenda for negotiations) and final stages (signing the agreement). An alternative explanation would suggest the importance of non-formal events in the bargaining process and the existence of parallel processes, one formal involving the technical issues, and one informal where those with a political role within their respective organizations would participate. As informal meetings / contacts are more likely to happen among actors with a political role, this would also explain the lack of correspondence between event attendance and perceived influence.

Section IV - An assessment of the comparative relational analysis of collective bargaining and indications for future research

Challenges and benefits in the implementation of SNA to collective bargaining

Rather than just summarising key findings from the comparative analysis presented in this report, this section is also aimed at providing an assessment of the comparative relational analysis using SNA tools and methods carried out in the NETWIR project. Based on this assessment, some recommendations on future research and the application of network analysis to the industrial relations field will be made.

Using SNA methodologies and instruments poses several challenges which in some respects are magnified when applied to the industrial relations field. As SNA methods require detailed actors' information, usually through surveys or structured interviews, achieving a high response rate constitutes the major challenge. This is aggravated in the case of collective bargaining due to the reluctance of actors to disclose information about themselves and relations with others in bargaining processes.

To overcome these problems, the NETWIR project developed a mixed methodology, combining semi-structured interviews with key actors, documentary analysis and the implementation of an online survey.

Three types of problems were reported by the actors surveyed when implementing the survey. The first and most important was related to the fear to disclose information about the bargaining process, the events attended, or the actors met during this process. This was particularly important among employers. The second was the length and detailed questions in the survey. Even though the survey was tested before being circulated to the actors surveyed and was expected to take less than ten minutes, some actors complained about the time spent in answering it. Finally, some of the actors surveyed also declined to answer as they did not perceive the direct benefits of using this methodology for their organisations.

An important methodological lesson from the NETWIR project is the importance of using mixed research approaches, combining qualitative and quantitative methods. The in-depth interviews carried out to map out the census of actors and events proved to be key in interpreting SNA survey-based findings. As SNA tends to deliver good descriptive information about bargaining networks, it is important to use qualitative information to make sense of them and provide analytical insights.

The research project focused on collective bargaining processes to negotiate a collective agreement. The duration of these processes varies from country to country, but they tend to be between 3-8 months. The project did not cover interactions beyond the negotiation process. This has been pointed out by some of the actors surveyed as an important aspect to be re-considered in future research, as a narrow focus on the bargaining process leading to an agreement does not allow to get the full picture of developments and the richness of interactions.

Summary of Key findings and Indications for Future Research

The objective of the NETWIR project was to implement Social Network Analysis methods and theoretical tools to the analysis of collective bargaining. It started from the premise that the adoption of relational lenses to analyse collective bargaining processes and coordination was a promising avenue to enrich our knowledge about these key dimensions of industrial relations systems. The project thus had a strong component of methodological innovation and exploration, but through the comparative analysis of two sectors and four countries it also aimed at extracting theoretical insights and open new avenues for future research.

In this way, the project has made a first important to contribution to existing research on industrial relations by providing first-time comparative evidence on collective bargaining networks using SNA methodologies. These bargaining networks have been analysed using standard methodologies in order to a) identify the main characteristics of the network; b) compute synthetic network indicators; c) compare them across countries and sectors.

Given its strong methodological component, the project has paid particular attention to find the adequate way to use SNA to analyse collective bargaining processes. And the results must be interpreted at the light of this. The implementation of the survey among the actors participating in bargaining processes in the four countries and the two sectors selected has faced several obstacles and has delivered low response rates in some cases. The country reports contain a more detailed discussion and assessment of the implementation problems faced as well as the reasons explaining low response to the survey, being reluctance of some actors (especially employers) to provide information about relations to other actors the most important one.

These obstacles in the implementation of the NETWIR project have served to reflect about the limits and potential of SNA to analyse collective bargaining. But most importantly at the light of the initial objectives, they have provided an opportunity to think about future applications of SNA to employment relations, including new areas of industrial relations research and ways to adapt SNA to them.

One of the goals of the NETWIR project was to explore the diversity of interactions taking place within bargaining processes and networks, to understand their role in achieving coordination. Specific questions were included in the survey asking actors to signal the

existence of informal interactions and assess their importance compared to formal interactions. The results show an important role for informal interactions, and in some cases they're considered key by actors in the bargaining network to achieve an agreement. There are however differences across countries / sectors. As expected, informality is more important role in Italy, a country whose industrial relations system is close to voluntarism. But even in the case of Spain and the Netherlands, with more formalised settings, actors perceive an important role for informality in networks.

Another goal of the action was to allow social partners to achieve a better knowledge of how coordination works in their respective countries / sectors and draw some policy lessons about potential mechanisms to facilitate reaching an agreement. The project results have provided rich information in relation to the objectives.

Network Centralisation, Power Concentration or Diffusion

An interesting feature of networks is the extent to which power remains dispersed within the network, or by contrast, it is concentrated in a relatively small number of actors who are key in the bargaining process. Network centralisation can also complement the network size indicator and help to understand potential coordination problems: in large networks with diffused power we can expect more coordination problems compared to large networks where power is concentrated in two / three persons.

One of the aspects explored with SNA is the role of relational power, i.e., the power built through interactions within the bargaining network. The results show that a more active and central role in the collective bargaining network does not necessarily means more influence. In other words, relational power (measured by centrality measures) acquired in the network does not necessarily translates into more capacity to influence outcomes. A reason for this could be the different roles of actors in the network; technical actors would be more active in the network in order to solve technical issues, whilst those actors with a political profile would only participate in the final stages of the bargaining process in order to sign the agreement and would accordingly score low in centrality measures.

The decentralized character of collective bargaining in the Dutch case suggests more dispersed power in the network and high density of relations, whilst the sectoral pattern of negotiations in Spain is conducive to a concentration of power in few actors in the network whose representatives in the bargaining process are in charge of reaching and signing an agreement. This is consistent with a higher density of relations in pharma in the Netherlands compared to Spain; when power is more dispersed, influence and trust can only be achieved by maintaining contacts with all the actors in the network. In a situation of concentration of power, where organizational hierarchy is important, density of relations tends to be lower as trust and influence is achieved through other means.

It is nonetheless interesting to note the lack of direct correspondence between centrality indicators and the most influential actors in any of the two countries, except for Pharma (2) in the Netherlands. Several explanations could be given to this fact. First, it shows that

a more active and central role in the collective bargaining network does not necessarily means more influence. In other words, relational power (measured by centrality measures) acquired in the network does not necessarily translates into more capacity to influence outcomes. A reason for this could be the different roles of actors in the network; technical actors would be more active in the network in order to solve technical issues, whilst those actors with a political profile would only participate in the final stages of the bargaining process in order to sign the agreement and would accordingly score low in centrality measures.

Bargaining Networks' Structures and Collective Bargaining

The analysis has served to highlight different relational logics across the countries and sectors compared. Bargaining networks in the four countries have different characteristics in terms of the number of actors involved, the events, the formality / informality of interactions, the density of relations etc. Despite these differences, some common sectoral logics can be found, therefore pointing to the importance of the sectoral context. Thus, in the case of the retail sector, sectoral collective bargaining processes occur in all countries, with a more important role for intra-union coordination compared to Pharmaceuticals. By contrast, in the chase of Pharma the landscape is more heterogeneous as two countries have company-level bargaining and the two others, sectoral bargaining.

Results also show the existence of different network configurations facilitating reaching an agreement. In those cases where the density of interactions is high, trust relations are more easily established, therefore paving the way to reaching an agreement. By contrast the concentration of power in some actors in the network has an ambiguous effect. In some cases, it is perceived as facilitating factor, particularly when this is concentrated in brokering actors, but in other cases may act as a hindrance to reach consensus within the network.

Some lessons can be extracted from the analysis carried out. First, the structure of bargaining networks has implications for the development of bargaining processes, and eventually, for reaching an agreement. High density of interactions and co-attendance of all actors in the bargaining network are related to a predominance of trust relationships and higher probabilities of reaching agreement.

Second, even in highly fragmented and decentralized bargaining settings, social partners can resort to a number of formal and informal mechanisms to coordinate activities both within their organisations and between them.

Third, whilst trust relations in the network constitute a favourable condition for reaching agreements, an adequate division of tasks between actors with technical and political roles in the process can help to speed up the process.

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