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The European Community of Law and the Communities of Case-law: Understanding legal concepts and processes through the lens of community detection algorithms

Urška Šadl[1,2] , Lucía López Zurita[2] and Sebastiano Piccolo[3]

[1]European University Institute, Fiesole, Italy, [2]MOBILE, University of Copenhagen, Copenhagen, Denmark and [3]University of Calabria, Rende, Italy
Corresponding author: Lucía López Zurita; Email: lucia.lopez.zurita@jur.ku.dk

Abstract
Community detection is a set of algorithms developed in network science to find meaningful sub-groups within larger groups. This article (1) outlines and evaluates the method and (2) shows how it can enrich ongoing debates about European integration. To this end, it uses the example of the approximation of laws, an enduring topic in European legal studies.

1. Introduction

Network analysis has become an accepted and increasingly used method for the analysis of law and institutions.[1] Studies typically use measures of case centrality to identify the position and the properties of individual judgements. By contrast, community detection is a set of algorithms used to map structures, finding meaningful sub-groups within larger groups: eBay users sharing similar interests, protein groups performing the same function in a cell,[2] or adult male bottlenose dolphins at Shark Bay competing for contested resources.[3] This article applies community detection to find meaningful sub-groups in the network of 11,836 judgements of the European Court of Justice (the Court) connected by 68,721 case citations. To demonstrate its value, it also discusses the European Union (EU)'s rule making in new policy areas, touching on the relationship between Europeanisation via rule-making and litigation.

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[1]While scholars have mapped citations between judgements to understand judicial authority, the force of precedent, behaviour of judges in collegiate courts, and legal developments. For an overview of literature see U Šadl and F Tarissan, 'The Network Approach' in CK and Joanne Scott (eds), *New Legal Approaches to Studying the Court of Justice* (Oxford University Press 2020) 92; M Derlén and J Lindholm, 'Goodbye van Gend En Loos, Hello Bosman? Using Network Analysis to Measure the Importance of Individual CJEU Judgements' 20 (2014) European Law Journal 667; W Alschner and D Charlotin, 'The Growing Complexity of the International Court of Justice's Self-Citation Network' 29 (2018) European Journal of International Law 83.

[2]S Fortunato, 'Community Detection in Graphs' 486 (2010) Physics Reports 75.

[3]'Dolphins form largest alliance network outside humans' (Science Daily, 29 August 2022) <https://www.sciencedaily.com/releases/2022/08/220829153233.htm> (last accessed 9 June 2024).

Community detection organises judgements into groups based on citations as visible and easily detectable links between judgements. Citations reveal a degree of legally relevant similarities between the judgements of one community (a common subject matter or policy), and dissimilarities with the judgements in other communities.

Mathematically, some judgements and groups of judgements are densely connected through citations whereas others are loosely connected to other judgements and groups of judgements. One expects that the judgements dealing with work related benefits generally cite other judgements dealing with the same or related legal issues like free movement of workers more than they cite judgements dealing with the rule of law, data protection, or asylum, and much more than judgements dealing with the European Stability Mechanism or structural funds. The community detection algorithm uses this information to divide or partition the network. The number, size, and composition (the legal content) of the communities can vary with a selected community detection algorithm.[4] Algorithms separate judgements about work-related benefits from the judgements about family members of European workers, or group them together in one larger community under the common theme of free movement of persons. Each algorithm leads to distinct classifications and structures, like the levels of granularity in the clusters; the selection of the algorithm should thus depend on the research aim.

Juxtaposing the results of several algorithms can remove doubts about the effect of the algorithm on the findings. The article considers this possibility and removes possible doubts by comparing the findings of five widely used community detection algorithms employing mathematically different strategies: *Fastgreedy*,[5] *Louvain*,[6] *Label propagation*,[7] *Walktrap*[8] and *Infomap*.[9] The selection of the community detection algorithm depends on the research question, and the measure of accuracy is the quality or usefulness of the findings. Algorithms dividing the network into many smaller communities are helpful in the analysis of micro-processes; algorithms producing fewer, larger communities are better suited for the analysis of macro-processes. An important advantage of *Fastgreedy* is that it identifies fewer, larger but still legally coherent and comprehensible sub-groups, which lend themselves to legal reconstruction. To demonstrate community detection as a viable research methodology (looking at macro-processes and structural changes), the analysis relies on the *Fastgreedy* algorithm that partitions the network in larger clusters.[10]

Qualitative exploration is an alternative validation method of community detection. However, the proposed approach in this article differs from mixed methods approaches, in that the findings of the network and legal analysis are interdependent. Legal analysis actively shapes the empirical methodology, meaning that legal scholars forestall the findings of the network analysis by selecting the algorithm in light of the research question, as well as validate, interpret, and analyse the findings. Section 2 further explores the interplay between the network and the legal approach.

Three aspects become crucial when calibrating community detection for legal purposes. The first is the congruity between a case citation and its legal meaning. The second is the congruity between litigation and the social, economic and political processes. The third is the congruity

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[4]Community detection and clustering are used interchangeably.

[5]A Clauset, MEJ Newman and C Moore, 'Finding Community Structure in Very Large Networks' 70 (2004) Physical Review E 66.

[6]VD Blondel et al, 'Fast Unfolding of Communities in Large Networks' 2008 (2008) Journal of Statistical Mechanics: Theory and Experiment P10008.

[7]UN Raghavan, R Albert and S Kumara, 'Near Linear Time Algorithm to Detect Community Structures in Large-Scale Networks' 76 (2007) Physical Review E 36.

[8]P Pons and M Latapy, 'Computing Communities in Large Networks Using Random Walks' in P Yolum et al (eds), *International Symposium on Computer and Information Sciences* (Springer 2005) 284.

[9]M Rosvall and CT Bergstrom, 'Maps of Random Walks on Complex Networks Reveal Community Structure' 105 (2008) Proceedings of the National Academy of Sciences 1118.

[10]See a more detailed explanation in U Šadl, L López Zurita and S Piccolo, 'Route 66: Mutations of the Internal Market Explored through the Prism of Citation Networks' 21 (2023) International Journal of Constitutional Law 826.

between the Court's information about the case and the object of litigation. All open the question of whether the findings of community detection can be interpreted and contribute to the understanding of legal phenomena.

So far, scholarship has convincingly dealt with the congruity between a case citation and its legal meaning.[11] Regarding the congruity between litigation and the social, economic and political processes, legal scholars readily assume that the Court's case-law has been central to the construction of the common market and the 'transformation of Europe.'[12] Although individual fast-developing policies have remained outside the Court's jurisdiction (historically the second and the third pillar) and hence court cases (like climate change law), litigation reflects broader societal conflicts and processes.[13]

Section 3 of the article touches on the congruity between the Court's information about the case and the object of litigation, showing that the Court's annotation of the case, which appears as a case label or subject matter (such as competition law or environment), correctly describes the legal issues that the case raised (such as agreements between undertakings or the approximation of laws), possible procedural or institutional matters that the Court dealt with (the powers of the Commission or grounds of appeal), and more concrete issues like access to the file under national procedural law. Scholars at times attach different value to the judgements. Citations, however, are meaningful beyond the label or subject matter, giving additional insight into the case-law and the processes related to litigation. To illustrate the point, the article engages with the most common label in the network, the approximation of laws, relating it to legal, institutional, and structural changes.

The article is organized in five sections. Section 2 describes community detection, also called clustering analysis, and techniques used in network science to validate its reliability. This more technical part of the article also demonstrates the reliability of the findings and engages with the interplay between the findings of the network approach and the legal analysis. Section 3 validates the findings qualitatively, unpacking the content of the selected communities. Section 4 discusses the insights of community detection on the example of the approximation of laws. Section 5 concludes.

2. Community detection: Appeal and application

Community detection or clustering is among network science's most discussed and relevant topics. It is widely used to identify the components of complex systems, unveiling significant or non-trivial internal network organisation that supports inferences about special relationships. Among other applications, the understanding of the community structure uncovers the properties of dynamic processes, such as the spreading of epidemics and innovation.[14]

The promise to unearth special relationships, to identify structural shifts in the legal system and to describe the dynamics of legal developments is intuitively appealing for scholars of European Union law and integration. This Section turns appeal into application on the network of 11.836 judgements of the Court of Justice decided from 1954 to 2020,[15] and 68.721 citations between

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[11]See eg Šadl and Tarissan (n 1); Derlén and Lindholm (n 1); Alschner and Charlotin (n 1).

[12]A-M Burley and W Mattli, 'Europe before the Court: A Political Theory of Legal Integration' 47 (1993) International Organization 41; JHH Weiler, 'A Quiet Revolution: The European Court of Justice and Its Interlocutors' 26 (1994) Comparative Political Studies 510.

[13]D Kelemen, *Eurolegalism: The Transformation of Law and Regulation in the European Union* (Harvard University Press 2011).

[14]Z Yang, R Algesheimer and CJ Tessone, 'A Comparative Analysis of Community Detection Algorithms on Artificial Networks' 6 (2016) Scientific Reports 30750.

[15]The 951 judgements that cite no other judgements and that no other judgement cites (the so-called isolates) are excluded from the analysis. These judgements would not contribute to the legal understanding of the structure because the clustering algorithm would place them in the same community.

them.[16] In network vernacular, the judgements are called nodes, and the citations are called edges.

Then, the Section deals with an important methodological question whether the choice of the algorithm pre-empts the findings, demonstrating that this is not the case. The Section further highlights the complementarity unleashing the full potential of the methodology.

The first subsection presents the findings of five algorithms. The second subsection compares the findings of the algorithms in terms of their similarity and hierarchy. Section 3 grapples with the logical next question of what the communities reveal about the legal structure (special relationships, legal processes, and general trends), adding a legal qualitative layer to the analysis.

A. Untangling the relationship between the algorithm and the findings

Fastgreedy,[17] *Louvain*,[18] *Label propagation*,[19] *Walktrap*,[20] and *Infomap*,[21] all widely used algorithms, define the concept of community differently, implementing complementary strategies to map and organize the network. Recall that a network is a structure of nodes (judgements) and edges (citations between judgements) – with citing judgements pointing to the cited judgements. Networks are represented with graphs; in the network of the Court's case-law, the graph is directed.

Two algorithms – *Fastgreedy* and *Louvain* – define communities as tightly connected groups of nodes (judgements) that are loosely connected with the rest of the network. Practically, they typically find bigger communities. To illustrate, Figure 1 below represents the most relevant communities found by *Fastgreedy*. The horizontal view shows the relative growth of a community over time (darker shades of the rows imply faster growth). The vertical view illustrates the structure of the case-law at any given time (the horizontal axis marks the year). Darker shading indicates a larger share of the community in the network.
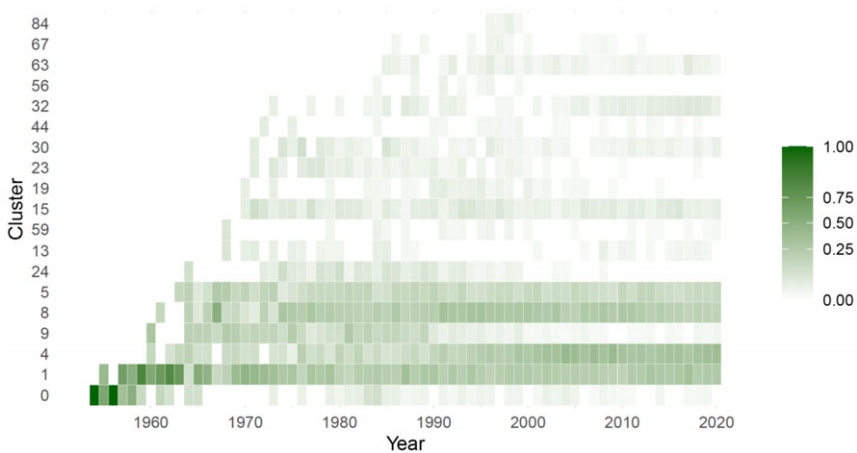
Figure 1. Communities of case-law (clusters). *Fastgreedy* identifies 19 cohesive communities (clusters); of those four are large (rows 1, 4, 8, and 5).

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[16]All nodes and links were extracted from two official and public sources of European case-law – the Court's own website, CURIA, and the Official Portal of the European Union, EUR-LEX. The sources were combined in the interest of consistency. The reliability of the findings depends on the completeness and consistency of EUR-LEX and CURIA. Given that the said sources are official, the data is of high quality and the findings therefore reliable.

[17]Clauset et al (n 5).

[18]Blondel et al (n 6).

[19]Raghavan et al (n 7).

[20]Pons and Latapy (n 8).

[21]Rosvall and Bergstrom (n 9).

By contrast, *Walktrap* defines a community as a group of nodes (judgements) in which a random walk, a process of visiting the judgements by moving randomly through citations, is likely to be trapped. *Infomap* employs the concept of an infinite random walk to approximate the information flow in the network. It defines a community as a set of nodes in which such an infinite random walk lingers longer. Finally, *Label Propagation* does not a priori define the concept of community but applies an iterative process to generate labels in the network. Initially, each node has its own label; subsequently, each node updates its label according to the most frequent label amongst its neighbouring nodes, until no further update is possible. The same labels cluster into one community.

The six squares in Figure 2 present a large network organized in smaller groups of judgements based on citations, regardless of citation content and thus the theme of individual communities. The first impression clockwise is that some algorithms find more groups than others (comparing the top and the bottom square in the middle of the two rows in Figure 2), and that the clusters found by each algorithm vary in size.

The number and the size of the communities vary depending on the algorithm. The below comparison illustrates a hierarchical relation between the communities: Algorithm A groups all judgements into one community and algorithm B divides the judgements in two sub-communities.
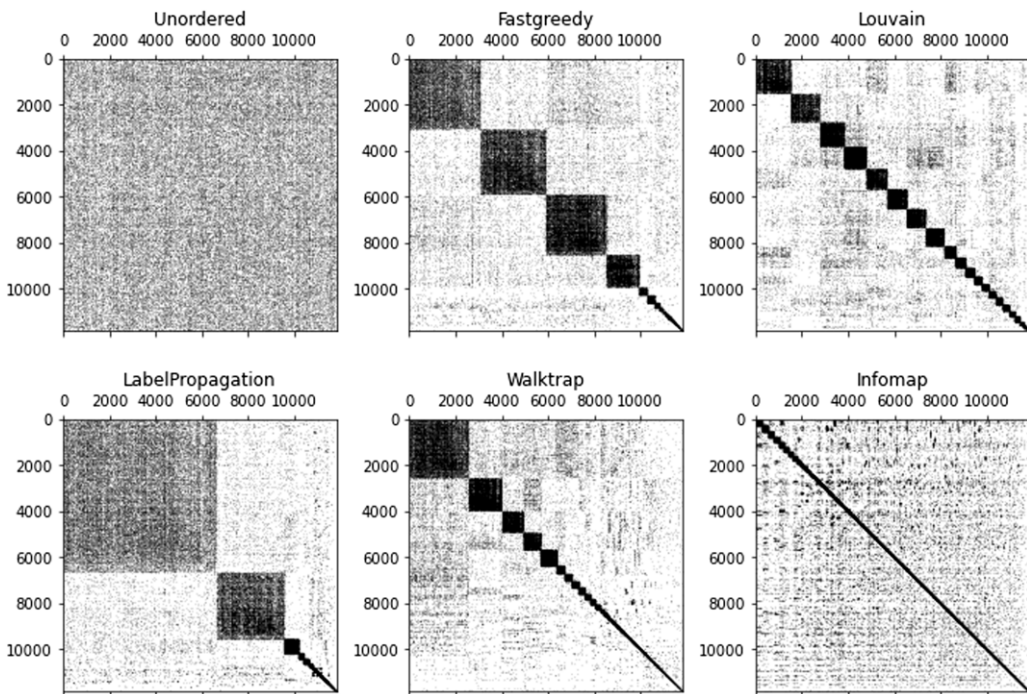
Figure 2. Visualizes the effect of community detection on the Court's citation network. The initial unordered adjacency matrix does not show any recognisable pattern. By applying community detection algorithms and discovering communities in data, the patterns become evident, and each algorithm shows some specific aspect of the data. *Fastgreedy* divides the networks into four big communities that account for ~10000 nodes (~85 per cent of the network) and a bunch of smaller ones. *Louvain* finds 18 communities plus some other small ones. *Louvain* mainly breaks down the four biggest communities from *Fastgreedy* into smaller ones. *Label propagation* finds a very large community which clusters together the first and the third largest communities found by *Fastgreedy*, another community which corresponds to the second largest community from *Fastgreedy* and a third smaller community that is a subset of the fourth community found by *Fastgreedy*. *Walktrap* highlights a core-periphery organisation of the network with one large community serving as a core and other 12 smaller communities followed by 550+ micro-communities. *Infomap* clusters the network in a large number (700+) of small communities. For all algorithms, it is clear how the detected clusters have higher internal density of connections than they have externally. Furthermore, the smaller a community, the higher its internal density.

Both produce similar findings, on a different level of detail/generality. For example, work-related benefits judgements including unemployment, sick leave or family benefits always remain in the same sub-group but group into a larger legally coherent community of free movement of persons with the judgements dealing with the entry and residence of family members, like cases on residence permits or reunification. The community labelled free movement of persons, which contains both sets of judgements, is hierarchically superior in network science terms.

Figure 2 shows the findings of *Fastgreedy, Louvain, Label Propagation, Walktrap,* and *Infomap* algorithms, employed with adjacency matrices. An adjacency matrix is a square used to represent a graph or a network, indicating whether pairs of nodes, meaning the points on the graph, or judgements are close together, that is, adjacent. A black dot is a connection from a node *i* (row) to a node *j* (column) – from judgement *i* to judgement *j*. Figure 2 first visualises the Court's citation network with its unordered adjacency matrix (first square to the left in the first row). Next, the rows and columns of the adjacency matrix are reordered according to the communities found by each algorithm and in decreasing order of community size/granularity. Reordering highlights the patterns in the network, distinguishing between densely connected areas on the main diagonal that are sparsely connected with the remaining network.

Figure 2 represents clear differences in community structures. A closer analysis reveals that *Fastgreedy* finds 103 communities, four of which are rather large and account for 85 per cent of the total nodes in the network (Figure 1 represents only 19 largest communities). *Louvain* detects 74 communities and exhibits the broadest distribution of community size amongst the algorithms. Its largest 18 communities cover 98 per cent of the judgements in the network. *Label propagation* detects 127 communities, of which the largest three account for 86 per cent of the judgements. *Walktrap* detects 589 communities, from which it is still possible to recognise a core-periphery structure of the network with the largest community as a dense internally connected network core and the periphery of smaller communities interacting with the core. Finally, *Infomap* detects 713 small and dense communities (the largest one contains 277 nodes as opposed to over 3000 nodes detected by *Fastgreedy* as presented in Figure 1, second adjacency matrix in the middle of the top row).

The adjacency matrices imply that algorithms could produce vastly dissimilar configurations, owing to the choice of the algorithm. The measures of similarity and hierarchical relationship, developed in network science, address this issue. They are discussed in the following Section.

B. Similarity as hierarchy

A legal analysis of the community structures (the reading of judgements in the same community) reveals whether the communities detected by the algorithms have similar content and by which legally relevant parameters, for example, a policy field or legal basis. The network science, by contrast, measures similarity as a hierarchical relation between the communities, meaning the extent to which different algorithms partition the network at different levels of granularity (thus creating communities of different sizes) and the hierarchical structure between them. This means that one algorithm groups together several communities discovered by another.

Algorithm performance is measured in terms of approximating the so-called ground truth. The appraisal of similarity and hierarchy implies a preliminary measure of ground truth – a labelling of elements that describes the objective or true assignment of elements to communities.[22] Labels offer verifiable information about each judgement, serving as a reference point. While the subject matter, which the Court assigns to each judgement, requires further reckoning before the findings

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[22]AN Albatineh, M Niewiadomska-Bugaj and D Mihalko, 'On Similarity Indices and Correction for Chance Agreement' 23 (2006) Journal of Classification 301; M Gosgens et al, 'Good Classification Measures and How to Find Them' in Ranzato et al (eds), *Advances in Neural Information Processing Systems, 34 – 35th Conference on Neural Information Processing Systems* (2021) 17136; D Pfitzner, R Leibbrandt and D Powers, 'Characterization and Evaluation of Similarity Measures for Pairs of Clusterings' 19 (2009) Knowledge and Information Systems 361; AJ Gates et al, 'Element-Centric Clustering Comparison Unifies Overlaps and Hierarchy' 9 (2019) Scientific Reports 8574.

of community detection can be used for legal analysis (a question addressed in Section 4), it is a solid basis for the assessment of similarity and hierarchy in network science terms.

The available measures can appraise the similarity between two cluster structures, or the overlap between a cluster structure and ground truth. Each has its own assumptions, reference models, and biases;[23] none is superior.[24] The first measures of association used in this analysis combine three commonly used complementary association measures in data mining: adjusted rand index (ARI),[25] adjusted mutual information (AMI),[26] and Fowlkes-Mallows index (FM).[27] The second measure combines informedness (BI), markedness (MK) and their geometric mean, the Matthew's correlation coefficient (MCC).[28]

Regarding the association measures, the ARI penalises algorithms wrongly separating a true cluster in too many clusters,[29] while AMI is biased towards cluster structures with more clusters[30] and FM is biased towards skewed cluster sizes.[31] The measures yield a score of 0 if two variables are independent and 1 if they are the same.

When comparing clustering with ground truth or the real structure of the network, informedness compares algorithm's findings against a random guess. If the guess is random, informedness is zero. Markedness indicates how consistently the algorithm clusters a pair of elements together (or apart). A random guess yields a zero score. Informedness and markedness are the two components of the Matthew's correlation coefficient. To illustrate, informedness of 0.5 means that the algorithm captures 50 per cent of ground truth, while markedness of 0.5 means that the algorithm correctly clusters every second pair of elements.

When comparing communities found by two algorithms (indicated with A and B) with informedness and markedness, informedness (A, B) measures the portion of A correctly captured by B. Markedness (A, B) measures the portion of B captured by A. The correlation coefficient MCC (A, B) is a symmetrical measure of similarity between A and B. It is possible to have instances of high informedness and low markedness. This means that the algorithm captures a large portion of ground truth (high informedness) but wrongly clusters together pairs that belong to different clusters or vice versa (low markedness). High informedness and low markedness usually indicate that the algorithm discovers overly big communities, clustering together dissimilar pairs. For example, *Label Propagation* clusters together cases on harmonization and liberalization. Conversely, low informedness and high markedness signals that the algorithm fails to account for a large share of ground truth but is very reliable for the small part of ground truth that it captures. This signals that the algorithm identifies overly small communities, separating pairs that should be clustered together; for example, the algorithm groups cases covering different aspects of social policy into different communities or clusters. Again, these measures take the perspective of the network science; the legal analysis, interpreting the findings, might arrive at

[23]S Romano et al, 'Standardized Mutual Information for Clustering Comparisons: One Step Further in Adjustment for Chance', *Proceedings of the 31st International Conference on Machine Learning* (PMLR 2014) <https://proceedings.mlr.press/v32/romano14.html> (last accessed 9 June 2024); Gates et al (n 22).

[24]Gates et al (n 22); Gosgens et al (n 22); Pfitzner et al (n 22).

[25]L Hubert and P Arabie, 'Comparing Partitions' 2 (1985) Journal of Classification 193. For the proof of No Free Lunch theorem for community detection (which implies that there can be no algorithm that is optimal for all possible community detection tasks) see L Peel, DB Larremore and A Clauset, 'The Ground Truth about Metadata and Community Detection in Networks' 3 (2017) Science Advances e1602548.

[26]NX Vinh, J Epps and J Bailey, 'Information Theoretic Measures for Clusterings Comparison: Variants, Properties, Normalization and Correction for Chance' 11 (2010) The Journal of Machine Learning Research 2837.

[27]EB Fowlkes and CL Mallows, 'A Method for Comparing Two Hierarchical Clusterings' 78 (1983) Journal of the American Statistical Association 553.

[28]DMW Powers, 'Evaluation: From Precision, Recall and F-Measure to ROC, Informedness, Markedness and Correlation' 2 (2011) International Journal of Machine Learning Technologies 37.

[29]Romano et al (n 23).

[30]Ibid.

[31]Gates et al (n 22).

Table 1. Table 1 compares the communities discovered by the five different algorithms: *Fastgreedy* (FG), *Louvain* (LM), *Label propagation* (LP), *Walktrap* (WT), *Infomap* (IM). A) Adjusted Mutual Information, B) Adjusted Rand Index, C) Fowlkes-Mallows score, D) Matthews Correlation Coefficient, E) Informedness, F) Markedness.

(A) AMI

	FG	LM	LP	WT	IM
FG	1				
LM	0.48	1			
LP	0.50	0.47	1		
WT	0.45	0.53	0.44	1	
IM	0.35	0.48	0.29	0.50	1

(B) ARI

	FG	LM	LP	WT	IM
FG	1				
LM	0.30	1			
LP	0.35	0.16	1		
WT	0.24	0.29	0.19	1	
IM	0.03	0.11	0.01	0.08	1

(C) FM

	FG	LM	LP	WT	IM
FG	1				
LM	0.41	1			
LP	0.54	0.35	1		
WT	0.36	0.35	0.40	1	
IM	0.14	0.23	0.10	0.20	1

(D) MCC

	FG	LM	LP	WT	IM
FG	1				
LM	0.34	1			
LP	0.39	0.25	1		
WT	0.27	0.29	0.30	1	
IM	0.12	0.22	0.07	0.18	1

(E) BI

	FG	LM	LP	WT	IM
FG	1				
LM	0.22	1			
LP	0.48	0.47	1		
WT	0.19	0.31	0.16	1	
IM	0.02	0.06	0.01	0.04	1

(F) MK

	FG	LM	LP	WT	IM
FG	1				
LM	0.52	1			
LP	0.31	0.13	1		
WT	0.39	0.28	0.53	1	
IM	0.66	0.78	0.48	0.69	1

different conclusions about the accuracy of a given algorithm. Whatever the algorithm chosen, the legal analysis must disentangle the connections and processes behind the clustering. Network clustering and the legal analysis are interdependent. The researcher selects the algorithms but does not determine the results.

Table 1 compares the communities discovered by five algorithms. Some differences are apparent. For instance, according to some measures (the AMI), the most similar communities are those found by *Louvain* (LM) and *Walktrap* (WT) (the score 0.53 in Table 1.A.). According to others (ARI, FM, and MCC), the most similar communities are those found by *Fastgreedy* (FG) and *Label propagation* (LP) (ARI score 0.35 in Table 1.B; FM score 0.54 in Table 1.C., and MCC score 0.39 in Table 1.D.). Overall, the co-occurrence matrix displayed in Figure 2 clearly shows that the communities discovered by the five algorithms are nested within each other.

Figure 3 shows the hierarchical organization between the communities. Concretely, the darker colour in the left square of Figure 3 indicates that fewer algorithms clustered a pair of nodes
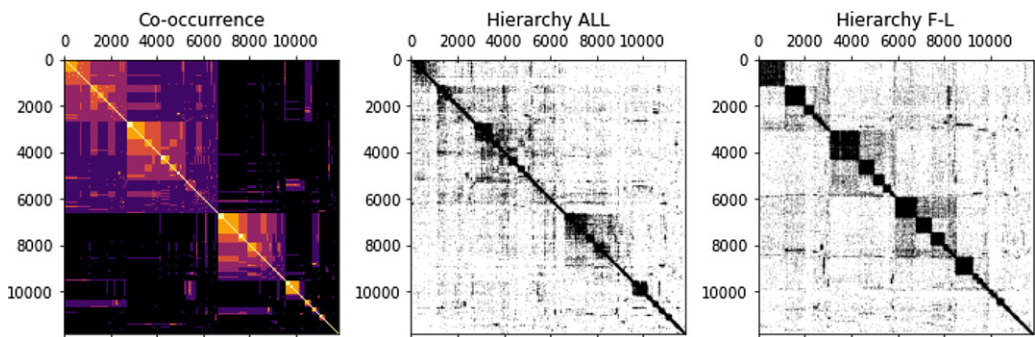
Figure 3. Shows the hierarchical organization of the Court's citation network. The co-occurrence matrix shows how the clusters found by the algorithms are nested into each other (left square). Hierarchy-ALL shows the adjacency matrix of the Court's case-law reordered according to the hierarchical order suggested by all the algorithms (middle square). Hierarchy F-L, shows the adjacency matrix reordered according to the hierarchical order suggested by *Fastgreedy* and *Louvain* (right square).

Table 2 The frequent subject matter of judgements in selected significant communities found by *Fastgreedy* (left column) and *Louvain* (right column). Some labels are identical, meaning that the communities overlap entirely. For instance, *Fastgreedy* community C15 includes the label 'common customs tariff' which corresponds to an identical *Louvain* community C23. Most communities, however, discovered by *Fastgreedy* and *Louvain* are similar with respect to the labels they include, such as the community dealing with taxation (third row).

Main labels in the communities identified by *Fastgreedy*	Main labels in the communities identified by *Louvain*
Approximation of laws, social policy, environment, consumer protection, intellectual property, free movement of goods, freedom to provide services, freedom of establishment and free movement of capital (C4/Harmonised market)	Environment, pollution, waste (C5)
	Social policy, consumer protection, fundamental rights (C4)
	Asylum policy, immigration policy, judicial cooperation in criminal matters (C25)
	Brussels Convention 27 September 1968, judicial cooperation in civil matters (C26)
	Intellectual property, copyright, trademarks, patents (C30)
Free movement of goods, free movement of persons, freedom to provide services, freedom of establishment and free movement of capital; approximation of laws (C8/Liberalised market)	Freedom to provide services, freedom of establishment (C6)
	Freedom of establishment, free movement of capitals, free movement of workers, freedom to provide services (C20)
	Free movement of goods, quantitative restrictions, MEQR (C13)
	Free movement of workers, association agreements, non-discrimination (C24)
Competition, agriculture (price, regulation, quotas) (C1/Competition)	Agreements, decisions, and concerted practices (C1)
	Provisions, fishery policy, principle of equality and non- discrimination, commercial policy, principle of proportionality, acts of the institutions (C2)
	State aid (C3)
	Intellectual property, trademarks (C36)
VAT, external relations (dumping, customs), agriculture (charges, own resources of the European Communities) (C5/Taxation)	VAT, excise duties and common customs tariffs (C21)
	European agricultural guidance and guarantee fund (C16)
	Customs union, free movement of goods (C28)
	Internal taxation (C9)
Staff regulation (C9/European Officials)	Staff regulation (C10)
Common Customs Tariff (C15/Customs Union)	Common Customs Tariff (C23)

together. Black areas indicate that no algorithm clustered these nodes together. The central square shows that the largest community found by *Label propagation* (6629 judgements) joins two large communities discovered by *Fastgreedy*, which further contain communities discovered by *Louvain*, *Walktrap* and *Infomap*. This means that the communities are hierarchically structured. The first square from the right shows that the communities discovered by *Louvain* are nested into the communities discovered by *Fastgreedy*.

Table 2 illustrates the relationship between the communities found by *Fastgreedy* and *Louvain* in a table format, looking at the labels assigned to the judgement. As stated above, it shows that the communities discovered by *Louvain* are nested into the communities discovered by *Fastgreedy* measured as the relationship and overlap between the labels.

Concretely, *Fastgreedy* groups judgements labelled as approximation of laws in diverse policy areas in one community. *Louvain* separates these judgements into six communities, all dealing with harmonization: (1) environmental policy, pollution, and waste, (2) social policy and

consumer protection, (3) asylum immigration, and cooperation in criminal matters, (4) judicial cooperation in civil matter, (5) intellectual, industrial and commercial property, and (6) freedom to provide services and freedom of establishment.

3. The legal lens

Subject matter predicts around 20 per cent of citations. On the one hand, this means that citations meaningfully connect judgements dealing with related legal questions assigned to the judgements by the Court. On the other hand, it calls for further engagement with alternative connecting factors and mechanisms, that is, legal analysis is required to unpack the clustering. Following a brief introduction, this Section explores the rationale of eight communities against their composition in terms of the subject matter, identifying and linking key structural changes to the legislative or institutional changes.[32] As stated in the introduction, the Section focuses on the communities found by *Fastgreedy,* which finds fewer but larger legally significant communities, allowing for the study of structural changes. The approach and the findings are used in Section 4 to describe and analyse the uneven development of European Union policies via regulation, reflected in the proliferation of the label 'approximation of laws'. Approximation of laws is commonly understood as harmonization – following the wording of (now) Article 114(1) and (4) TFEU. The following sections use the terms interchangeably.

A. Communities of case-law

The description of each individual community includes a Figure, demonstrating the composition of the community by subject matter – the primary point of reference in Section 2 and the starting point of the legal analysis. The horizontal view shows the relative growth of each community over time with darker shades implying faster growth. The vertical axis shows the content. Some communities are more heterogeneous (contain judgements with many different labels and several rows). Darker shading indicates a larger share of the subject matter/label at a given time (the horizontal axis displays the year).
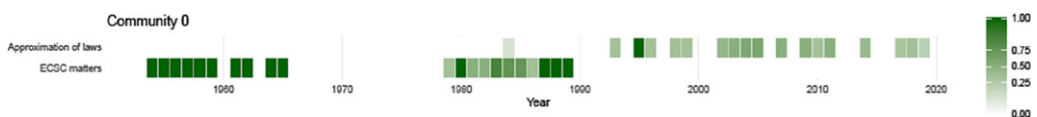
Community 0/European Coal and Steel Community (ECSC)

Figure 4. Displays the most frequent labels in the community 'ECSC'.

The ECSC community covers 66 years of European integration (1954–2020), nicely illustrating the potential of community detection to reveal institutional change. The judgements in the community are labelled by the Court as ECSC and approximation of laws. Until 1992, the community contained only judgements labelled 'ECSC', while post 1992, the label 'approximation of laws' became dominant. This shift extends to the type of proceedings: Annulment actions

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[32]Given the space constraints, we limit ourselves to the description of eight communities, which are both especially relevant from the legal point of view and paradigmatic of how the clustering serves to unravel structural changes in the case-law of the Court.

dominate until 1992 but are replaced by preliminary references then. Upon the expiration of the Merger Treaty in 2002, the community practically disappeared.[33]

The turning point is the judgement in *Pierrel*,[34] where the Court declared that the suspension or revocation of a market authorization could rely exclusively on the grounds laid down in Community legislation.

The judgements issued after 1990 mostly deal with market authorizations: for foodstuffs, or most commonly for medicinal products, frequently questioning the possibility of parallel imports. They raise questions of the application of secondary law, usually in relationship with the Treaty. A good example is the judgement in *Paranova*,[35] addressing whether the withdrawal of market authorisation for medicinal products complies with the free movement of goods (Articles 28 and 30 EEC) when it simultaneously withdraws the authorisation for parallel imports. The Court held that such withdrawal was compatible with the Treaty only if the Member State could justify it with the need to safeguard public health.

Community 5/Taxation
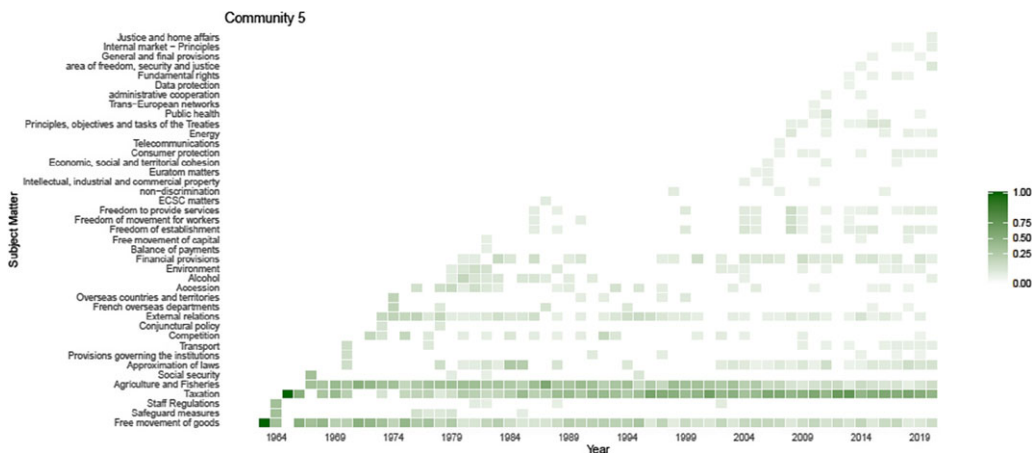
Figure 5. Displays the most frequent labels in the community 'taxation'.

Community 'Taxation' is one of the larger communities with 12 per cent of all judgements in the network. The most common subject matter is 'taxation', followed by 'external relations', 'free movement of goods' and 'agriculture and fisheries'. Despite the varied subject matters the judgements are closely linked to tax: The cases under 'taxation' are generally VAT cases, whereas the cases under the subject matters 'free movement of goods' and 'agriculture and fisheries' relate to fiscal charges and customs. 'External relations' cases refer to dumping and customs.

The community highlights the changes in litigation in response to legislative changes.[36] The community has expanded since the eighties, coinciding with the harmonization of the VAT in

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[33]The Treaty expired but some of the measures remained, notably in the field of energy, now in merged form and with a new competence title in Article 194 TFEU after Lisbon. See D Benson and D Russel, 'Patterns of EU Energy Policy Outputs: Incrementalism or Punctuated Equilibrium?' 38 (2015) West European Politics 185. This coincides with the growing of the label 'energy' in community 4.

[34]Case C-83/92 *Pierrel* ECLI:EU:C:1993:915.

[35]Case C-15/01 *Paranova* ECLI:EU:C:2003:256.

[36]See D Chalmers and M Chaves, 'The Reference Points of EU Judicial Politics' 19 (2012) Journal of European Public Policy 25.

1977.[37] The Court facilitated/enhanced the enforcement of the new rules by allowing individuals to invoke the unimplemented VAT Directive,[38] and declaring that national courts could apply European Union law ex officio, irrespective of and contrary to national procedural law.[39] The fastest growing period in the community spans from 2007 to 2019, following the recasting of the Sixth VAT Directive in 2006.[40] The development of the community can only be understood against the enforcement effort of the Commission, in particular inerasing cross-border hurdles to trade which could impair the internal market.[41] Around half of the infringement proceedings judgements in the community fall in this period of growth.[42] Furthermore, the incomplete harmonization of VAT has kept the litigation high in the area via preliminary references.[43]

Community 15/Customs Union
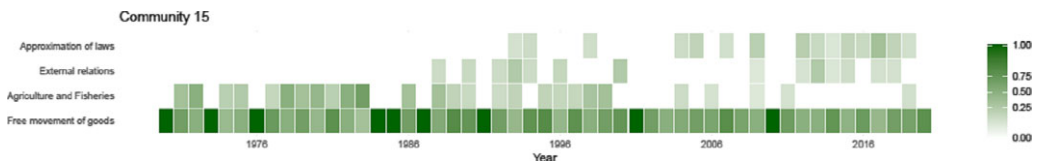
Figure 6. Displays the most relevant labels in community 'Customs Union'.

Community 15 comprises 2.28 per cent of cases. This relatively small community includes only four labels. 'Free movement of goods/customs tariff' is the main label. Most cases refer to the classification of products under the Common Customs Tariff Code (CCT). For instance, in the first case in the community, the Court declared that Member States could not issue binding interpretations relating to the headings of the CCT.[44] The second most common group of cases in the community is labelled 'agriculture and fisheries' with judgements referring to the classification of agricultural products and foodstuffs under the CCT. The labels, 'external relations' and 'approximation of laws', appear only in the late eighties, remaining sparse. The judgements with those subject matters also concern the classification of agricultural products.

The judgements were delivered between 1970 and 2020. The fastest growing periods in the community arose late in the integration process.[45] Figure 6 highlights three such periods. The first and largest occurred between 1993 and 1997. The community also expanded in the period of 2006-2009 and, to a lesser extent, between 2013 and 2015. The three periods of expansion relate to

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[37]Second Council Directive 77/91/EEC of 13 December 1976 on coordination of safeguards which, for the protection of the interests of members and others, are required by Member States of companies within the meaning of the second paragraph of Article 58 of the Treaty, in respect of the formation of public limited liability companies and the maintenance and alteration of their capital, with a view to making such safeguards equivalent, 1977 OJ L 26/1. An analysis of the extent to which VAT Directives harmonize in J Tudor, 'Making Sense of the European Union's Vat Tax System: Does the European Court of Justice's Jurisprudence Support Harmonization?' 7 (2018) Global Business Law Review 76.

[38]Case C-8/81 *Becker* ECLI:EU:C:1982:7.

[39]Case C-312/93 *Peterbroeck* ECLI:EU:C:1995:437.

[40]Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax, 2006 OJ L 347/ 1.

[41]R Lyal, 'Compatibility of National Tax Measures with EU Law: The Role of the European Commission in Tax Litigation before the European Court of Justice' 24 (2015) EC Tax Review 5.

[42]ML Escudero, 'Case C-154/08, Commission v Spain; Judgment of the Court; Third Chamber, of 12 November 2009; Not yet Reported' 48 (2011) Common Market Law Review 227.

[43]S Cornielje, 'The Costly Stalemate of EU VAT Harmonization' (2022) 31 EC Tax Review 85.

[44]Case C-14/70 *Bakels* ECLI:EU:C:1970:102.

[45]LJ van der Burg, 'The Customs Tariff and Customs Legislation in the European Communities (Some Juridical Problems)' 7 (1970) Common Market Law Review 184.

the years following the three most relevant amendments to the Common Customs Tariff Regulation.[46]
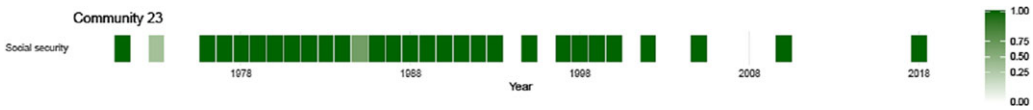
Community 23/Social policy

Figure 7. Displays the most frequent labels in the community 'social policy'.

Community 23 counts 61 judgements labelled social policy, representing only 0.5 per cent of the cases in the network. All were preliminary references about very concrete issues, like the calculation of pensions, subsidies and benefits, and the rules in case of overlapping.[47] The first case in the community is *Keller*, where the Court declared that when the insured periods completed under the legislation of one Member State were sufficient to derive a right to a pension, that Member State did not need to consider other periods completed under the legislation of another Member State.[48] The most recent judgement is *Blanco Marqués,* which discusses whether Spain could detract a supplement from the plaintiff who also received a pension from Switzerland (it could not).[49]

Figure 7 indicates punctuated growth with periods of fast expansion (late 70s to the early 90s) and decline (since 2000).
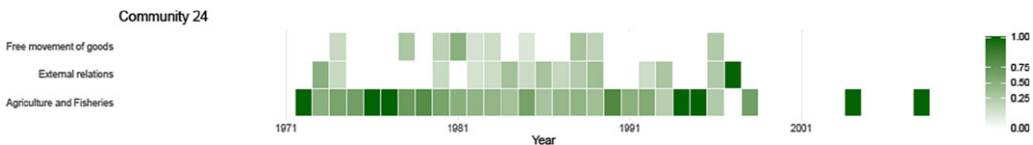
Community 24/Free movement of agricultural products

Figure 8. Displays the most frequent labels in the community 'free movement of agricultural products'.

Community 'Free movement of agricultural products' illustrates the potential of community detection to identify growth and stagnation. The community stalled at the turn of the century, reflecting broader changes. Three main subject areas in the community are 'agriculture and fisheries', 'external relations' and 'free movement of goods', all related to agricultural products. Judgements labelled 'external relations' deal primarily with agricultural products,[50] and those with the label 'free movement of goods' with Article 34 TFEU and free movement of agricultural

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[46]Commission Regulation (EEC) No 2587/91 of 26 July 1991 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and the Common Customs Tariff; Commission Regulation (EC) No 1719/2005 of 27 October 2005, and Commission Regulation (EC) No 948/2009 of 30 September 2009, 1987 OJ L 256/1. This also reflects a broader political and legal strategy by lobbies to change the CCT, see P Bouwen and M Mccown, 'Lobbying versus Litigation: Political and Legal Strategies of Interest Representation in the European Union' 14 (2007) Journal of European Public Policy 422.

[47]Regulation (EEC) No 1408/71 of the Council of 14 June 1971 on the application of social security schemes to employed persons and their families moving within the Community, 1971 OJ L 149/2.

[48]Case C-22/71 *Keller* ECLI:EU:C:1971:105.

[49]Case C-431/16 *Blanco Marqués* ECLI:EU:C:2018:189.

[50]For instance, quotas for agricultural products coming from third countries or implementation of international trade agreements affecting foodstuff.

products.[51] This is intuitively sound, given the proximity of free movement of goods to agriculture and fisheries in the early years of the European Communities.[52]

The changes in the community structure reflect the policy shifts in the internal market. The community grew fastest from the late seventies to the early nineties, coinciding with the implementation of the ambitious Commission's Single Market program,[53] and legislation.[54] Many legal instruments were adopted in the areas of agriculture and fisheries and the free movement of goods, as regulatory adjustments were required for the correct functioning of the incipient common market for agricultural products.[55] From 2000, no judgements are labelled as 'external relations' and 'free movement of goods' in the community, which is consistent with the general disappearance of cases on goods from the docket of the Court.[56] Judgements with the label 'agriculture and fisheries' become sparse, reflecting the sparsity of new legislation, due to the difficulties in passing legislative reforms in this area, where the interests of the Members States diverge greatly.[57]

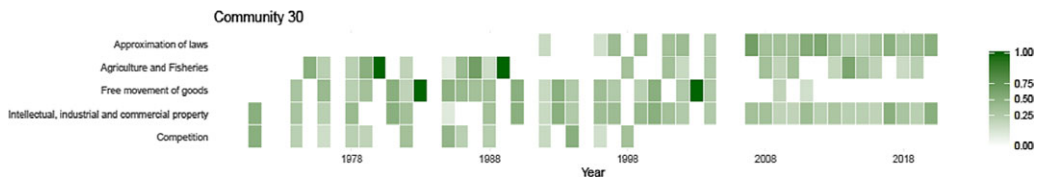### Community 30/The regulation affecting intellectual property

Figure 9. Displays the most frequent labels in the community 'the regulation affecting intellectual property'.

Community 'The regulation affecting intellectual property' extends from 1971 to 2020. It is a good illustration of the relationship between the meaning of citations and labels (subject matter). The judgements in the community carry a priori unrelated labels like 'intellectual, industrial and

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[51]A fraction of cases under free movement of goods have 'customs duties' as secondary subject matter, but they also refer to agricultural products (and more particularly, beef).

[52]KP Purnhagen, 'The End of Agricultural Exceptionalism in EU Free Movement Law and Competition Law after Lisbon?' [2019] Wageningen Working Papers of Law and Governance <https://papers.ssrn.com/abstract=3391134> (last accessed 9 June 2024).

[53]European Commission, 'Completing the Internal Market: White Paper from the Commission to the European Council', COM (1985) 310 final (29 June 1985).

[54]DG Demekas et al, 'The Effects of the Common Agricultural Policy of the European Community: A Survey of the Literature' 27 (1988) Journal of Common Market Studies 113.

[55]For instance, several cases refer to the regulation on special measures from agricultural products (like peas), export licenses and legislation on compensatory amounts for an array of different reasons. Plus the need to accommodate changes in the international legal framework, see WD Coleman and S Tangermann, 'The 1992 CAP Reform, the Uruguay Round and the Commission: Conceptualizing Linked Policy Games' 37 (1999) Journal of Common Market Studies 385; A historical perspective of changes in K Purnhagen and A Matthews, 'European Agriculture and the Bioeconomy: A Historical Overview' in L Dries et al (eds), *EU Bioeconomy Economics and Policies: Volume I* (Springer International Publishing 2019).

[56]J Zglinski, 'The End of Negative Market Integration: 60 Years of Free Movement of Goods Litigation in the EU (1961–2020)' 31 (2023) Journal of European Public Policy 633.

[57]The difficulties in reforming the CAP, mostly due to opposed interests of Member States (also linked to internal pressures with the country) are well known, see for instance F Laursen and P Nedergaard, 'The Political Economy of CAP Reform', in F Laursen and P Nedergaard (eds), *The Political Economy of European Integration* (Martinus Nijhoff Publishers 1995) 111; C Rutz, J Dwyer and J Schramek, 'More New Wine in the Same Old Bottles? The Evolving Nature of the CAP Reform Debate in Europe, and Prospects for the Future' 54 (2014) Sociologia Ruralis 266; The regulation of specific sectors has not been easier, see for the case of wine T Innattoni, 'Commission Impossible: The Commission of the European Communities' Attempt to Reform the Common Market Organization for Wine Note' 19 (2009) Indiana International & Comparative Law Review 383. More recently, the same pattern is taking place with reforms aimed to a 'greening' of the CAP, see for instance MA Maneschi, 'Greening the CAP from Farm to Fork: Roots of Italy's Resistance to the Process of Reform' 22 (2023) EuroChoices 30.

commercial policy', 'competition', 'free movement of goods' and 'agriculture and fisheries.' That said, all cases touch on intellectual property matters from slightly different angles. The 'competition' judgements focus on the role of patents in the competition law provisions. The 'free movement of goods' judgements address general matters of intellectual property, like parallel imports of pharmaceutical products, where the patent is key. Finally, (fewer) 'agriculture and fisheries' judgements refer to market authorizations, keeping a looser link to intellectual property. In the mid-nineties, the 'approximation of laws' judgements appear in the community. Those cases refer to intellectual property but in regulated areas (secondary legislation).[58]

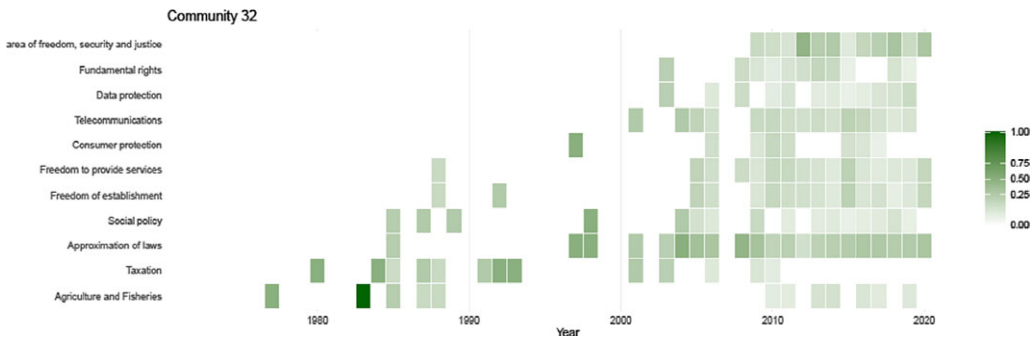### Community 32/Politically significant policies

Figure 10. Displays the most frequent labels in the community 'politically significant policies'.

Community labelled 'Politically significant policies' illustrates the changing density of the communities, reflecting the strength of the connections between the judgements and allowing for the examination of special relationships. The community forms in 1973 but becomes denser around 2000, when litigation becomes more frequent. Today, it is one of the densest and fastest growing communities.

The composition of the community is varied and eclectic. Many judgements, particularly from 2000, concern the area of freedom, security, and justice (AFSJ), and equally many cases deal with electronic communications and data protection. The judgements do not share the subject matter but are bound by increased regulation of more politically significant areas without a direct and close relationship to the regulation of the four freedoms, notably asylum, criminal and police cooperation and data protection.[59] Moreover, the structure of the community reflects broader institutional changes: The Treaty of Lisbon abandoned the pillar structure,[60] which included the AFSJ among the shared competence under the jurisdiction of the Court,[61] and increased regulation.[62]

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[58] In particular, Council Regulation (EEC) No 1768/92 of 18 June 1992 concerning the creation of a supplementary protection certificate for medicinal products and Regulation 1610/96 of the European Parliament and of the Council of 23 July 1996 concerning the creation of a supplementary protection certificate for plant protection products, 1992 OJ L 182/1.

[59] Šadl et al (n 10).

[60] J Salminen, 'Depillarization and the Shaping of AFSJ' 18 (2011) Maastricht Journal of European and Comparative Law 275.

[61] V Hatzopoulos, 'Casual but Smart: The Court's New Clothes in the Area of Freedom Security and Justice (AFSJ) after the Lisbon Treaty' 2 [2008] College of Europe Research Papers in Law/Cahiers juridiques.

[62] J Monar, 'The EU's Growing External Role in the AFSJ Domain: Factors, Framework and Forms of Action' 27 (2014) Cambridge Review of International Affairs 147.

Community 63/Legal basis/Article 115 TFEU[63]
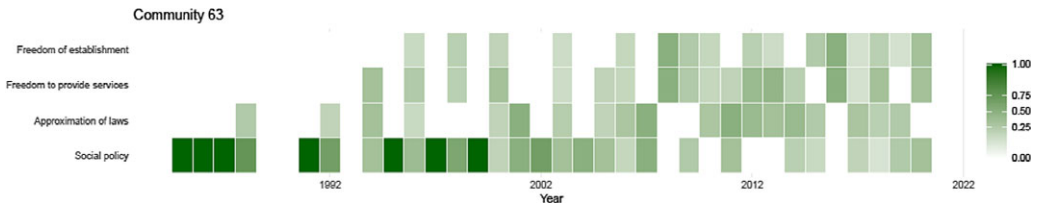
Figure 11. Displays the most frequent labels in the community 'Legal basis/Article 115 TFEU'.

The 'Legal basis' community includes judgements labelled mostly as 'social policy', 'approximation of laws', 'freedom to provide services' and 'freedom of establishment'. All 'social policy' judgements deal with the protection of workers in the event of transfers of undertakings.[64] 'Approximation of laws' judgements are mostly related to civil liability linked to the use of vehicles,[65] and fair price comparisons.[66] Judgements labelled 'freedom of services' and 'establishment' relate to commercial agents,[67] so they share a connection to companies and frequently groups of companies.[68] A closer analysis reveals that all Directives were adopted on the same legal basis (Article 115 TFEU, ex Article 100 TEC). Moreover, legislative changes account for the fast growth of the community (1990, 1995 and 2017–2019), with litigation dealing with those legislative instruments. At times, legislation did not change, but the Court expanded its previous case-law. This has been the case for the Acquired Rights Directive.[69] Dating back to the golden period of social policy, the Directive was reformed in 2001, but the label expanded in recent years, as the Court built on its case-law to apply the principles developed on its transfer of undertakings' jurisprudence to 'new commercial situations and matrices (albeit without pushing the boundaries too far)'.[70]

[63]Art 115 TFEU states that the Council shall, acting unanimously on a proposal from the Commission and after consulting the European Parliament and the Economic and Social Committee, issue directives for the approximation of such laws, regulations or administrative provisions of the Member States as directly affect the establishment or functioning of the common market.

[64]As regulated in the Council Directive 77/187/EEC of 14 February 1977 on the approximation of the laws of the Member States relating to the safeguarding of employees' rights in the event of transfers of undertakings, businesses or parts of businesses (now Directive 2001/23), 1977 OJ L 61/26.

[65]Directives 72/166/EEC of 24 April 1972 on the approximation of the laws of Member States relating to insurance against civil liability in respect of the use of motor vehicles, and to the enforcement of the obligation to insure against such liability, repealed by Directive 2009/103 of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability, 1972 OJ L 103/1.

[66]Directives 84/450/EEC of 10 September 1984 relating to the approximation of the laws, regulations and administrative provisions of the Member States concerning misleading advertising and Directive 97/55 of European Parliament and of the Council of 6 October 1997 amending Directive 84/450/EEC concerning misleading advertising so as to include comparative advertising, 1984 OJ L 250/17.

[67]Directive 86/653/EEC of 18 December 1986 on the coordination of the laws of the Member States relating to self-employed commercial agents, 1986 OJ L 382/17.

[68]KE Sørensen, 'Groups of Companies in the Case Law of the Court of Justice of the European Union' 27 (2016) European Business Law Review 393.

[69]Directive 2001/23 of 12 March 2001 on the approximation of the laws of the Member States relating to the safeguarding of employees' rights in the event of transfers of undertakings, businesses or parts of undertakings or businesses, 2001 OJ L 82/16.

[70]J McMullen, 'Leaving a Legacy: Recent Jurisprudence of the European Court on Transfer of Undertakings' 50 (2021) Industrial Law Journal 130, 131.

B. Summary

As illustrated in Sections 2 and 3, network analysis and legal analysis mutually inform and cross-validate each other in three ways. First, community detection unravels relations among judgements, which more routine methods of identifying legal communities of cases would miss or underplay. Thus, the findings force a closer investigation of overlooked connections and processes that might prove significant. For instance, Community 30 grouped judgements that at first appeared dissimilar, as the labels were seemingly disconnected. However, a closer look articulated the connection, as all cases referred to different aspects of intellectual property. Sometimes the connections would have been even harder to grasp using other methods, as shown by Communities 63 and 32. For the former, the cases are connected by the same legal basis, for the latter, diverse and eclectic subject matters come together because the judgements relate to new secondary legislation in areas with no apparent connection to the market. However, only legally informed interpretation of the findings can support convincing conclusions. Second, community detection shows which institutional, structural, political, and legal developments are reflected in litigation, but also that litigation is not only a carnival mirror of social reality. Third, community detection supports the investigation of micro- (where the network is partitioned in smaller communities) and macro-processes (where the network is partitioned in fewer bigger communities), adding knowledge to the ongoing debates about the state, the priorities, the direction, and the appeal of integration.

Institutional change primarily explains the structural shift of some communities. In this sense, Community 0/ECSC (Figure 4) evolves from ECSC to the approximation of laws around 1992, when the latter subject matter becomes dominant,[71] disappearing after 2002 with the expiration of the Merger Treaty.[72]

Legislative changes, frequently followed by the enforcement effort of the Commission, contextualize the shifts in litigation patterns in Community 5/taxation (Figure 5). The latter took off in the eighties, following the harmonization of the VAT in 1977.[73] The Court facilitated the enforcement of the new rules by allowing individuals to invoke the unimplemented VAT Directive,[74] and declaring that national courts could apply European law ex officio, irrespective of and contrary to national procedural law.[75] This is reflected in Figure 5 (row four from the bottom), which shows an expansion of the label 'taxation' during those years. The fastest growing period between 2007 and 2019 follows the recasting of the Sixth VAT Directive in 2006,[76] and the Commission's subsequent enforcement effort. Half of the infringement proceedings in the community, approximately 100 cases, corresponds to this period of growth, which again translates into an expansion of the label 'taxation' in the community (Figure 5, row four). This coincides with doctrinal analysis linking the 'incomplete' harmonization process in VAT with a never-ending litigation.[77] Similarly, the periods of faster growth in Community 15/Customs Union

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[71] The turning point is case C-83/92, *Pierrel*, ECLI:EU:C:1993:915, where the Court declared that the suspension or revocation of a market authorization could rely exclusively on the grounds laid down in Community legislation. From that point onwards, there are no more cases with the label ECSC.

[72] Treaty of Brussels (Merger Treaty), 1967 OJ (257) 2.

[73] Second Council Directive 77/91/EEC of 13 December 1976 on coordination of safeguards which, for the protection of the interests of members and others, are required by Member States of companies within the meaning of the second paragraph of Art 58 of the Treaty, in respect of the formation of public limited liability companies and the maintenance and alteration of their capital, with a view to making such safeguards equivalent, 1977 OJ L 26/1.

[74] Case C-8/81 *Becker* ECLI:EU:C:1982:7

[75] Case C-312/93 *Peterbroeck* ECLI:EU:C:1995:437

[76] Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax, 2006 OJ L 347/ 1.

[77] Cornielje (n 43). Along the same lines, see R de la Feria, 'Blueprint for Reform of VAT Rates in Europe' 43 (2015) Intertax 154.

follow the three most relevant amendments to the Common Customs Tariffs Regulation:[78] 1993–1997, 2006–2009 and, to a lesser extent, 2013-2015.

By contrast, litigation dwindles where legislation and case-law settle. This translates into communities that grow slowly or altogether stop growing. For instance, Community 23/social policy (Figure 7) grew particularly fast from the late seventies to the early nineties, and stagnated afterwards. This is unsurprising when we consider the cases in the community, which share the label 'social security' and relate to very concrete aspects of the calculation of pensions, subsidies and benefits, and the rules in case of overlapping.[79] The legal questions dominating the early years of integration are largely solved,[80] making litigation redundant.

Conversely, litigation intensified after 2004 in the areas where the Union has traditionally had little to no competence to regulate but rather to support and coordinate the policies of the Member States. Community 5/taxation reflects this. As shown in Figure 5, in the last two decades the community has incorporated new labels, like trans-European networks (row eight from the top) or data protection (row six from the top), where the Union has taken a more active role only recently, often crystalized in new legislation.[81] Community 32/politically significant policies similarly shows that in the last two decades, the judgements with the labels 'AFSJ' (Figure 10, first row from the top), 'data protection' (third row) and 'telecommunications' (fourth row) increased.[82]

4. Application: The approximation of laws

The approximation or harmonization of national rules is a process of progressive convergence of national rules towards a common standard defined by the European Union.[83] This process is limited to the harmonization measures necessary to address divergences which obstruct the fundamental freedoms and negatively affect the functioning of the internal market. The legal basis for the approximation of laws in Chapter 3 of Title VII of TFEU does not stop short of the internal market, and harmonization measures often affect policy areas where the European Union cannot legislate, like employment policy or public health. The adoption of common rules reflects the Union's priorities. Those priorities have proved politically contentious and difficult to realize at times. Legislation has been subject to litigation, reflected in the growth and diversification of Community 4 (described in the first subsection) and as the emergence and the multiplication of

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[78]Commission Regulation (EEC) No 2587/91 of 26 July 1991 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and the Common Customs Tariff; Commission Regulation (EC) No 1719/2005 of 27 October 2005, and Commission Regulation (EC) No 948/2009 of 30 September 2009, 1987 OJ L 256/1.

[79]Regulation 1408/71 of the Council of 14 June 1971 on the application of social security schemes to employed persons and their families moving within the Community, 1971 OJ L 149/2. The regulation has been amended, but the changes affect the annexes, where Member States indicate the peculiarities of their own systems. See Regulation (EC) No 1992/2006 of the European Parliament and of the Council of 18 December 2006 amending Council Regulation (EEC) No 1408/71 on the application of social security schemes to employed persons, to self-employed persons and to members of their families moving within the Community, 2006 OJ L 392/1.

[80]In the last five years, only five judgements refer to the Regulation in the operative part.

[81]A good example is trans-European networks (TENs). The Maastricht Treaty provided the legal basis for establishing TENs in the areas of transport, telecommunications and energy. A first set of guidelines was replaced by several regulations in the 2000s, which were recast recently in a regulation. See Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013, 2022 OJ L 152/45.

[82]Many cases refer to the European Electronic Communications Code. Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (Recast), 2018 OJ L 321/36.

[83]S Peers et al (eds), *The EU Charter of Fundamental Rights: A Commentary* (Second edition, Hart Publishing 2021); M Kellerbauer, M Klamert and J Tomkin (eds), *The EU Treaties and the Charter of Fundamental Rights: A Commentary* (Oxford University Press 2019).

the label 'approximation of laws' and related labels in other communities (discussed in the second subsection).

Section A describes Community 4, labelled 'harmonized market'. Section B argues that legislative priorities and institutional changes, the role of the Commission and the Court explain the composition and growth of the communities studied.

A. A progressively harmonized market

Community 4 developed in the mid-1970s and expanded in the mid-2000s. Its slow start is unsurprising given the unsuccessful early unification attempts, which would have required a political will inexistent at the time.[84]

In the early 1980s, the Commission took several Member States to Luxembourg for not living up to their commitments in the environmental domain, notably pollution.[85] It filed an action against the Netherlands for not transposing the Council Directive on the quality of bathing water,[86] and against Belgium[87] for the non-implementation of a directive on waste from the titanium dioxide industry, and the Directive on waste.[88] This is reflected in the expansion of the label 'environment' in Community 4 (Figure 12, row 19 from the bottom). Around the same time, the Commission launched an ambitious internal market program, aiming to complete the internal market and remove all physical, technical and fiscal barriers.[89] Several legal instruments were enacted as a result, especially oriented to ensuring the free circulation of safe products across the Union.[90] Concerned with non-compliance (either for lack of transposition or deficient implementation), it also pursued an aggressive enforcement strategy,[91] which is visible in Community 4 in the expansion of the label 'free movement of goods' between the mid-eighties and the mid-nineties (Figure 12, row 4 from the bottom).

Social policy was supposed to correct the market. Its growth, particularly from the mid-eighties, corresponds to the enactment of key legislative instruments,[92] of which three especially stand out. First, the Equal Treatment Directive[93] gave rise to intense litigation during the eighties,[94] leading to milestone judgements like *Johnston, Von Colson, Kamann,* and *Marshall,*[95] which forge the

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[84]A Vauchez, 'When Scholarship Matters: Theory-Building and Theory Effects in the EU Polity Context' (2020) iCourts Working Papers 16.

[85]The history of enforcement of European environmental policy is discussed in A Hofmann, 'Left to Interest Groups? On the Prospects for Enforcing Environmental Law in the European Union' 28 (2019) Environmental Politics 342.

[86]Case C-96/81 *Commission v Netherlands* ECLI:EU:C:1982:192.

[87]Case C-68/81 *Commission v Belgium* ECLI:EU:C:1982:25.

[88]Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, 2008 OJ L 312/3.

[89]European Commission, 'Completing the Internal Market: White Paper from the Commission to the European Council', COM (1985) 310 final (29 June 1985).

[90]See for instance Council Directive 92/59/EEC of 29 June 1992 on general product safety, 1992 OJ L 228/24.

[91]J Tallberg, 'Making States Comply: EC Enforcement and the Internal Market Program' (Seattle, WA 1997) <http://aei.pitt.edu/2741/> (last accessed 9 June 2024).

[92]An analysis of the evolution in C Barnard, 'EU "Social" Policy from Employment Law to Labour Market Reform' in P Craig and G de Búrca (eds), *The Evolution of EU Law* (Oxford University Press 2021) 678.

[93]Council Directive 76/207/EEC on the implementation of the principle of equal treatment for men and women as regards access to employment, vocational training and promotion, and working conditions, 1976 OJ L 39/40, now replaced by Directive 2006/54/EC of the European Parliament and of the Council of 5 July 2006 on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation (recast), 2006 OJ L 204/23.

[94]C Kilpatrick, 'Community or Communities of Courts in European Integration? Sex Equality Dialogues Between UK Courts and the ECJ' 4 (1998) European Law Journal 121; C Kilpatrick, 'Gender Equality: A Fundamental Dialogue' in S Sciarra (ed), *Labour Law in the Courts : National Judges and the European Court Justice* (Hart 2001) 31.

[95]Cases C-222/84 *Johnston* ECLI:EU:C:1986:206; C-14/83 *Von Colson and Kamann* ECLI:EU:C:1984:153; C-271/91 *Marshall* ECLI:EU:C:1993:335.
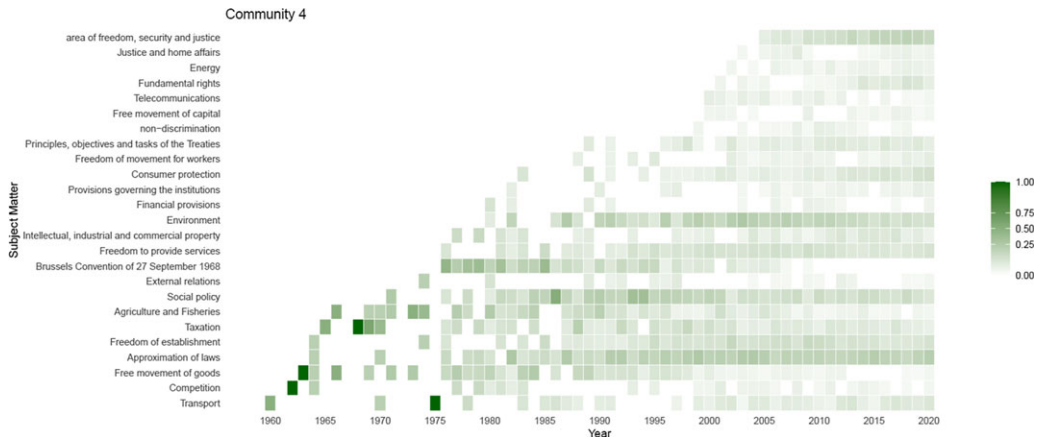
Figure 12. Displays the most frequent labels in the community 'harmonized market'.

central principles of European Union law: judicial review, conform interpretation/indirect effect. Those judgements shared the label 'social policy', which as shown in Figure 12 expanded in the community during the eighties and nineties (row 11 from the bottom).[96] Second, the first Working Time Directive, enacted in 1993,[97] spurred a wave of litigation including an annulment proceeding brought by the United Kingdom.[98] The Court's judgements substantially expanded on aspects that the Directive did not address. For instance, the Court ruled that on-call duty was to be considered working time.[99] The Member States did not welcome the expansion, and a proposal for amending the legislation, essentially to contain the interpretation of the Court, was pursued[100] but ultimately rejected. Litigation continued, including several infringement actions brought by the Commission for absent or deficient implementation.[101] The Court confirmed its previous interpretations in new rulings, overwhelmingly deciding in favour of employees and against national or employers' practices,[102] thus probably prompting more litigation. Finally, the Framework Directive on Fixed Term Work in 1999 led to many preliminary questions, mainly from Spain and Italy.[103] The Court has also taken a rather protective stance, at least in the less controversial aspects of the Directive,[104] without fully assimilating the Directive in other anti-discrimination instruments.[105] In other

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[96]They were largely based on Art 119 TFEU, see C Barnard, 'The Principle of Equality in the Community Context: P, Grant, Kalanke and Marschall: Four Uneasy Bedfellows?' 57 (1998) The Cambridge Law Journal 352.

[97]Council Directive 93/104/EC of 23 November 1993 concerning certain aspects of the organization of working time, 1993 OJ L 307/18.

[98]Case C-84/94 *United Kingdom v Council of the European Union* ECLI:EU:C:1996:431.

[99]Case C-303/98 *Sindicato de Médicos de Asistencia Pública (Simap) v. Conselleria de Sanidad y Consumo de la Generalidad Valenciana* ECLI:EU:C:2000:528.

[100]T Nowak, 'The Working Time Directive and the European Court of Justice' 15 (2008) Maastricht Journal of European and Comparative Law 447.

[101]Cases C-484/04 *Commission v. United Kingdom* ECLI:EU:C:2006:526 and C-158/09 *Commission v. Spain* ECLI:EU:C:2010:292. An analysis in T Nowak, 'The Turbulent Life of the Working Time Directive' 25 (2018) Maastricht Journal of European and Comparative Law 118.

[102]Nowak (n 100).

[103]Council Directive 1999/70/EC of 28 June 1999 concerning the Framework Agreement on Fixed-term Work Concluded by ETUC, UNICE and CEEP, 1999 OJ L 175/43. A good analysis of the litigation in Spain in JA Fuentetaja Pastor, *Función Pública y Derecho Europeo* (Civitas Thomson Reuters 2018).

[104]For instance, the question of conversion of fixed-term contracts into permanent contracts remains thorny, see C de la Porte and P Emmenegger, 'The Court of Justice of the European Union and Fixed-Term Work: Putting a Brake on Labour Market Dualization?' 27 (2017) Journal of European Social Policy 295.

[105]M Bell, 'The Principle of Non-Discrimination within the Fixed-Term Work Directive' in MA Mareau (ed), *Before and After the Economic Crisis* (Edward Elgar Publishing 2011) 155.

words, all instruments spurred intensive litigation in the area of social policy, as captured by *Fastgreedy* in Community 4. As shown in Figure 12 (row 11), the label 'social policy' becomes more relevant in the community in the years following the enactment of those instruments: the mid-eighties, after the coming into force of the Equal Treatment Directive; the nineties, following the first Working Time and the Framework Directives, and again in the mid-2000s, coinciding with key developments in the Court's case-law on the Working Time Directive[106] and the recast of the Equal Treatment Directive.[107]

Taxation became vibrant in the eighties with the harmonization of VAT in 1977,[108] and has continued to grow,[109] as reflected in the expansion of the label 'taxation' in Community 4 (Figure 12, row eight from the bottom). In *Becker*, the Court declared that an individual could rely on the unimplemented VAT Directive.[110] As shown in Figure 12, this coincided with the first expansion of the label 'taxation'. A decade later, the Court held that national courts could apply a provision of European Union law *ex officio* even when national procedural law excluded this possibility.[111] This is again reflected in Figure 12, with another growth of the label 'taxation' around those years.

Consumer protection judgements surged in the nineties after the adoption of the Maastricht Treaty, which established the Union's shared competence in that policy field,[112] and liberated consumer protection from the constraints of linking consumer rights to the protection of the internal market.[113] Many preliminary references touched on the Unfair Terms Directive,[114] particularly mortgages and the banking sector.[115] Figure 12 shows (row 23 from the bottom) that the label first appears in Community 4 in the mid-nineties, but drastically expands after the economic crisis in the 2000s, where litigation intensified and led to many judgements regarding mortgages and with the label 'consumer protection'.[116] As put by Reich and Micklitz, the economic crisis in the 2010s *revived* the Unfair Contract Terms Directive.[117]

Environmental cases date to the eighties (in line with the strengthening of the Commission's take on infringement),[118] with litigation growing exponentially after 2000,[119] as reflected in

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[106] Nowak (n 100).

[107] Directive 2006/54/EC of the European Parliament and of the Council of 5 July 2006 on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation, 2006 OJ L 204/23.

[108] Sixth Council Directive 77/388/EEC of 17 May 1977 on the Harmonization of the Laws of the Member States Relating to Turnover Taxes—Common System of Value Added Tax: Uniform Basis of Assessment, 1977 OJ L 145/1.

[109] There are comparatively few taxation cases in Community 4 because the algorithm has placed them in community 5, where the development of case-law linked to the different tax directives (particularly VAT) is apparent.

[110] Case C-8/81 *Becker* ECLI:EU:C:1982:7.

[111] Case C-312/93 *Peterbroeck* ECLI:EU:C:1995:437.

[112] HW Micklitz and S Weatherill, 'Consumer Policy in the European Community: Before and after Maastricht' 16 (1) (1993) Journal of Consumer Policy 285.

[113] Micklitz and Weatherill (n 113) 299.

[114] Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts, 1993 OJ L 95/29.

[115] European Regulatory Law Project, 'The Over-Indebtedness of European Consumers : A View from Six Countries' (2014) 10 EUI Working Paper.

[116] For instance, case C-415/11 *Mohammed Aziz* ECLI:EU:C:2013:164. For an analysis, see among others European Regulatory Law Project (n 115); G Comparato and I Domurath, 'Financialisation and Its Implications for Private Autonomy in Consumer Credit Law' Amsterdam Law School Research Paper No. 2018-12; M Junuzovic, 'Blurred Lines: Between Formal and Substantive Transparency in Consumer Credit Contracts' 8 (2019) Journal of European Consumer and Market Law 97; H-W Micklitz, 'The Consumer: Marketised, Fragmentised, Constitutionalised' in D Leczykiewicz and S Weatherill (eds), *The Images of the Consumer in EU law : Legislation, Free Movement and Competition Law* (Oxford University Press 2016) 21.

[117] N Reich and HW Micklitz, 'The Court and Sleeping Beauty: The Revival of the Unfair Contract Terms Directive (UCTD)' 51 (2014) Common Market Law Review 771.

[118] Tallberg (n 91).

[119] M Mendrinou, 'Non-compliance and the European Commission's Role in Integration' 3 (1996) Journal of European Public Policy 1, 10–11. She adds commercial policy, economic and financial policy, development and external relations, budgets and financial control.

Figure 12 (row 19, label environment). The timing corresponds to the combined effect of the Commission's legislative and enforcement strategies. The first Barroso Commission prioritised the energy and climate package, featuring a handful of directives;[120] the Commission has traditionally taken a strict stance towards infringements,[121] at least until being able to rely on private parties and decentralized enforcement.[122]

The newly minted area of justice and home affairs took off after 2005, particularly after its full inclusion in the Treaty of Lisbon. In 2005, the Court held in *Pupino*[123] that national criminal courts could apply a Council Framework Decision in the context of police and judicial cooperation in criminal matters. As shown in Figure 12 (row 12 from the top), the label first enters the community in the mid-2000s, and has grown steadily ever since.

The most recent judgements in the community increasingly deal with more contested matters like asylum, immigration, services of general interest, protection of fundamental rights, and taxation (VAT).[124] Those are also increasingly subject to approximation and high on the list of legislative priorities,[125] although political preferences of the Commission might change following political debate and contestation.[126]

B. European priorities, legislative change, and institutional action

Figure 1 shows a faster growth of Communities 4, 5, and 32 and a slower growth of Communities 8, 23, and 24. The shifts in litigation patterns in the communities respond to a large extent to institutional and legislative changes, notably the expansion of European Union's competences to regulate novel policy areas prone to politicization and contestation, as well as the Commission's enforcement priorities. However, the most interesting development pertains to the multiplication and the spread of the label 'approximation of laws'.

Around 15 per cent (1985) of judgements are labelled the approximation of laws. Most concern services (866), environment (282), consumer protection (276), goods (265), agriculture (167), taxation (154), social policy (55), and various aspects of intellectual property like patents or trademarks (478).

The label 'approximation of laws' is notably present in ten of twelve largest communities; most judgements, 83 per cent, are spread among the four largest communities, and 41 per cent are in a single large community – thus labelled 'the progressively harmonized market community' (Figure 12).

Apart from the proliferation of secondary legislation, the label 'approximation of laws' highlights a more frequent interaction between the communities. Regulation triggers disputes that

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[120]H Kassim et al, 'Managing the House: The Presidency, Agenda Control and Policy Activism in the European Commission' 24 (2017) Journal of European Public Policy 653, 664.

[121]Kassim et al (n 120). This might be starting to change, see Hofmann (n 86).

[122]Hofmann (n 85).

[123]Case C-105/03 *Pupino* ECLI:EU:C:2005:386.

[124]Šadl et al (n 10).

[125]Asylum is a good example. The Common European Asylum System was established in 1999, and an array of legal instruments were enacted to provide a common framework. For instance, the first Asylum Procedure Directive was enacted in 2005 (Council Directive 2005/85/EC of 1 December 2005 on minimum standards on procedures in Member States for granting and withdrawing refugee status, 2005 OJ L 326/13, and recasted in 2013 (Directive 2013/32/EU of the European Parliament and of the Council of 26 June 2013 on common procedures for granting and withdrawing international protection, 2013 OJ L 180/60. The migratory crisis has brought asylum high on the list of priorities and the Commission proposed a new Directive in 2016 (Proposal for a Regulation of the European Parliament and the Council establishing a common procedure for international protection in the Union and repealing Directive 2013/32/EU, 2016 COM(2016) 467 final).

[126]For instance, the European Arrest Warrant lingered low on the priorities for long but topped the list post 9/11. See M Den Boer and J Monar, 'Keynote Article: 11 September and the Challenge of Global Terrorism to the EU as a Security Actor' 40 (2002) Journal of Common Market Studies 11.

fall between policy areas. European citizenship is a classic example of the spillover from the free movement of workers and social security to the area of political and family rights.[127]

Individual communities have become more heterogeneous, as reflected in the diversification of the subject matter. In Community 4/harmonized market, more classic European Union law fields like freedom to provide services coexist with newer labels like consumer protection or AFSJ. In Community 32/politically significant policies (Figure 10), the expansion of regulation is indicated by the emergence of new labels. The label 'consumer protection' first appears in the community in the mid-nineties but grows after 2010. The increase coincides with stark litigation about mortgage contracts following the economic crisis,[128] mostly referred to the Unfair Terms Directive. Interestingly, the Directive gave rise to very little litigation in its first years, but became central with the surge of over-indebted consumers (mostly property owners) after the economic crisis, particularly in some Member States.[129] The Court responded in a 'perhaps even activist way',[130] encouraging more references from national courts, though the interest of the Court in these cases seems to have decreased recently.[131] Similarly, the label 'AFSJ' appears after 2010, following the Treaty of Lisbon, the inclusion in the shared competence, and the growing litigation in the area of asylum and migration.[132] The multiplication of the label 'environment', present since the late eighties, expands in the mid-2000s due to 1) institutional change (the Lisbon Strategy on 'sustainable development'), 2) legislative process (the push of the Barroso Commission) and 3) the Commission's role in enforcement/the enforcement strategy.[133] Notwithstanding numerous pushback and crises, the environmental acquis has proved resilient.[134]

The example also illustrates that the changes in litigation frequently respond to the Commission's priorities and enforcement strategies.[135] Environmental protection case-law after 1980 is the result of numerous infringement proceedings (Figure 12, label environment),[136] and its decline of the reprioritization of environment with energy and climate package by the first Barroso Commission.[137] The label persists due to the decentralized enforcement via preliminary references through national courts (Figure 12, row 19 from the bottom).[138] Similarly, a shift in the Commission's enforcement policy in consumer protection can be observed as a decline of infringement actions and the rise of preliminary references on the Unfair Terms Directive,[139]

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[127]For instance, EU citizenship is at the heart of a right to pursue Medicine studies in a different Member State, where a student cannot secure a place in their home Member State. See case C-73/08 *Bressol* ECLI:EU:C:2010:181.

[128]European Regulatory Law Project (n 115).

[129]I Domurath, G Comparato and H-W Micklitz, 'The Over-Indebtedness of European Consumers–A View from Six Countries' Working Paper, EUI LAW, 2014/10; G Comparato, 'The Design of Consumer and Mortgage Credit Law in the European System' in H-W Micklitz and I Domurath (eds), *Consumer Debt and Social Exclusion in Europe* (Routledge 2015) 9.

[130]Reich and Micklitz (n 117) 772.

[131]SA Brekke et al, 'That's an Order! How the Quest for Efficiency Is Transforming Judicial Cooperation in Europe' 61 (2023) Journal of Common Market Studies 58.

[132]V Passalacqua, 'Legal Mobilization via Preliminary Reference: Insights from the Case of Migrant Rights' 58 (2021) Common Market Law Review 751.

[133]Notably the REACH regulation. Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, 2006 OJ L 396/1.

[134]C Burns, P Eckersley and P Tobin, 'EU Environmental Policy in Times of Crisis' 27 (2020) Journal of European Public Policy 1.

[135]Kassim et al (n 120).

[136]J Tallberg, 'Making States Comply: The European Commission, the European Court of Justice, and the Enforcement of the Internal Market' (Lund University 1999) <http://lup.lub.lu.se/record/19167> (last accessed 9 June 2024).

[137]Kassim et al (n 120) 664.

[138]In this sense see Hofmann (n 85).

[139]Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts, 1993 OJ L 95/24.

particularly with respect to mortgages and the banking sector.[140] The latter explains the persistence of litigation since 2000, and the prevalence of consumer protection within community 4 (Figure 12).

Yet, decentralized litigation via preliminary references and the centralized push of infringement action alone cannot explain the expansion and development of the communities. Both piggybacked on the Court's commitment to the strengthening of the European Union legal order. Generally, the expansion of the harmonized market community in the eighties is parallel to the Commission's launch of an ambitious internal market program aiming to erase all physical, technical, and fiscal barriers to trade (leading to SEA).[141]

The Court's case-law has historically opened an alternative channel for legal gap-filling, legislative amendment, and novel legislative agendas. As aptly put by Scharpf, the Court has 'strategic value as an instrument of European legislation'.[142] In its long shadow, the litigants seized the opportunity to initiate, accelerate, or terminate the process of policy making,[143] with litigation driving integration.[144] The communities largely reflect this, for instance, the expansion of consumer protection in Community 4.[145] Similarly, the expansion of the label 'AFSJ' in Communities 32 (Figure 10, first row from the top) and 4 (Figure 12, twelfth row from the top) reflects the mobilization of legal actors across different Member States, [146] not always with the explicit opposition of national governments.[147] The Court interpreted rights generously (which explains the expansion of Communities 4 and 32),[148] particularly in the context of arrest warrants and expulsion.[149] Strikingly, the emphasis on fundamental rights at times allows for substantial differentiation among Member States.[150]

Finally, litigation remains high in areas heavily reliant on judge-made law, given the scarce legislative output. A good example is intellectual property, in which undertakings have engaged in long-term litigation strategies to shape policy.[151] As shown in Figure 12 (row 12 from the bottom), the label 'intellectual property' keeps a high and steady number of cases, which the creation of a specialized court dealing with matters related to patents is unlikely to alter.[152]

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[140]European Regulatory Law Project (n 115).

[141]European Commission, 'Completing the Internal Market: White Paper from the Commission to the European Council', COM (1985) 310 final (29 June 1985).

[142]FW Scharpf, 'The Joint-Decision Trap Revisited' 44 (2006) Journal of Common Market Studies 845, 852.

[143]SK Schmidt, *The European Court of Justice and the Policy Process: The Shadow of Case Law* (Oxford University Press 2018); FW Scharpf, 'Negative and Positive Integration', in Id, *Governing in Europe: Effective and Democratic?* (Oxford University Press 1999) 43.

[144]Kelemen (n 13).

[145]HW Micklitz, 'Judicial Activism of the European Court of Justice and the Development of the European Social Mode in Anti-Discrimination and Consumer Law' (December 1, 2009). EUI Working Papers LAW No. 2009/19; Reich and Micklitz (n 118).

[146]Passalacqua (n 132).

[147]J Bornemann, 'The Role of Member State Governments in Migration Litigation before the ECJ' 22 (2020) European Journal of Migration and Law 541.

[148]K Lenaerts, 'The Contribution of the European Court of Justice to the Area of Freedom, Security and Justice' 59 (2010) International & Comparative Law Quarterly 255.

[149]S Prechal, 'Mutual Trust Before the Court of Justice of the European Union' 2 (2017) European Papers – A Journal on Law and Integration 75; G Anagnostaras, 'Mutual Confidence Is Not Blind Trust! Fundamental Rights Protection and the Execution of the European Arrest Warrant: *Aranyosi and Caldararu*' 53 (2016) Common Market Law Review 1675.

[150]E Bertolini and M Dawson, 'Fundamental Rights as Constraints to and Triggers for Differentiated Integration' 27 (2021) Swiss Political Science Review 637.

[151]Bouwen and Mccown (n 46).

[152]H Ullrich, 'The Unified Patent Court' 42 (2023) Yearbook of European Law 135.

5. Conclusion

The article introduced an interdisciplinary approach where the methods of community detection and legal analysis cross-validate each other. It demonstrated the approach to shed new light on the growing pace and scale of the approximation of laws, a legally significant and politically at times contentious development.

The approach differs from the mixed methods approaches, combining quantitative and qualitative methods, where the legal experts complement the findings of quantitative analysis with a more detailed qualitative findings to produce a more nuanced or complete picture of the world. On the contrary, the findings of the network science methods depend on the findings of the legal analysis just as much as the findings of legal analysis depend on the network science. Legal scholars are not passive consumers of network science methods but active co-architects of its methodology. By engaging with the method, they add to the knowledge about the development of European Union law and – as demonstrated by the analysis – the political and institutional change driving or impeding its development.