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From network structure to network evolution in cross-border cooperation: a longitudinal analysis of a Polish-German cross-border region

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ABSTRACT

Border regions have long been analysed as microcosms of broader European integration processes, where integration becomes concrete through cross-border interlinkages. The European Commission supports such interlinkages through Interreg. Yet, network analytical studies of cross-border cooperation have not explicitly analysed network evolution. This paper proposes a dynamic framework and asks how cooperative relationships evolve and what shapes their emergence and durability. Using temporal exponential random graph models and a new dataset of small Interreg projects in one Polish-German cross-border region over two Interreg periods, the paper shows that past embeddedness – through community membership and actor centrality – increases the likelihood that new ties emerge. By contrast, persistence is less consistently associated with these mechanisms and appears more sensitive to programme rhythms and organisational capacity. These findings show that integration across borders unfolds through relational dynamics over time, and they demonstrate the value of longitudinal network analysis for European integration research.

KEYWORDS

Cross-border cooperation;
European integration;
longitudinal network
analysis; Interreg; small
projects fund

1. Introduction

Cooperation across borders has long been identified as an important aspect of European integration (González-Gómez and Gualda 2020; Setti 2025; Sousa 2013; Svensson and Nordlund 2015). As internal borders within the European Union became more permeable from the 1990s onwards, border regions increasingly attracted scholarly attention as sites where integration processes become visible on the ground (Scott 1999; van Houtum 2000). In both policy discourse and academic research, border regions have since been cast as testing grounds: the European Commission has described them as ‘living labs of European integration’ (European Commission 2021), while scholars have conceptualised them as microcosms of broader integration processes (Sousa 2013).

Through funding programmes such as Interreg, the European Commission supports cross-border projects on the ground, while aiming to foster durable patterns of

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cooperation across borders. The importance attached to these efforts is illustrated by the sheer amount of funding available: Interreg was worth 6.5 billion Euros for cross-border cooperation in the 2021–2027 funding period alone (European Commission [n.d.](#)). Crucially, cross-border networks are required for implementing Interreg programmes, but they are also a key policy objective, with Interreg policy documents encouraging the creation and perpetuation of such networks (Harguindéguy [2007](#); Interreg Bayern-Tschechien [2022](#), 53; Interreg Brandenburg-Polen [2014](#), 46). The rationale for this emphasis lies in the anticipated benefits of these networks: they foster trust, reduce transaction costs, and enhance capacities for joint problem-solving (Decoville and Durand [2021](#)). They can also create durable cross-border relationships that outlast individual projects (Szmigiel-Rawska and Dołzbłasz [2012](#)).

Not surprisingly, then, scholars have long presented cross-border cooperation in network terms (Blatter [1997](#); Frątczak-Müller and Mielczarek-Żejmo [2020](#); Soeters [1993](#)). This work has generated important insights into the structure of cooperation and the factors that shape it (Durand and Nelles [2014](#); González-Gómez and Gualda [2020](#)). Yet, much of the network analytical literature on cross-border cooperation has operationalised such cooperation at one point in time or merged ties from different years into a single network. This provides valuable insights into the functioning of networks, and can identify important correlates and structural features. However, it cannot speak directly to their inherently dynamic character as an evolving pattern of cross-border links. If European integration is understood relationally as ‘increasing and intensifying relations’ across borders (Svensson and Nordlund [2015](#), 373), then repeated interactions and the evolution of partnerships are central to what integration means on the ground.

To complement existing network analytical accounts of cross-border cooperation, this paper therefore adds a longitudinal perspective by examining how cooperative relationships evolve over time and what factors shape their emergence and durability. The paper proposes a way of analysing cross-border cooperation dynamically using data from the small projects fund (SPF), a strand of Interreg that supports small-scale cross-border initiatives. The analysis is based on an original dataset covering all SPF-funded projects in one cross-border Euroregion¹ across two funding periods. The comprehensive 16-year coverage of the dataset makes it possible to analyse how cross-border cooperative networks evolve over time, and what network mechanisms drive the formation and persistence of cross-border partnerships.

2. Dynamic networks in cross-border cooperation

Border regions are often defined functionally as those territories adjacent to state borders where political, social or economic interlinkages across borders vary in intensity but constitute a defining feature (Walther and Reitel [2013](#); Nelles and Durand [2014](#); cf. Sohn and Giffinger [2015](#)). It is precisely these interlinkages at the sub-national level that have made border regions a focus of European integration policy and research. Network analytical techniques have been used productively to study individual organisations’ links to overall cross-border networks (Svensson and Nordlund [2015](#); Walther and Reitel [2013](#)). Since the mid-2010s, there has been an explosion of studies that employ network analytical techniques to investigate cross-border networks (Briot et al. [2021](#); Dörry and Decoville [2016](#); Durand and Lamour [2014](#); Durand and Nelles [2014](#); González-Gómez and

Gualda 2020; Niavis, Kallioras, and Petrakos 2024; Sohn and Giffinger 2015; Svensson and Nordlund 2015; Walther and Reitel 2013). There is a focus in these studies on relationships that embed organisations in a cooperative cross-border network, be it a communication network (Svensson and Nordlund 2015) or a network devoted to information exchange (Durand and Nelles 2014).

This literature demonstrates the analytical value of treating cross-border cooperation as a relational phenomenon, including studies that identify drivers of cooperation and governance dynamics (Durand and Nelles 2014; González-Gómez and Gualda 2020; Niavis, Kallioras, and Petrakos 2024; Svensson and Nordlund 2015; Walther and Reitel 2013). At the same time, most network analytical studies in this field rely on single-period networks, or on pooling cross-border ties across time (e.g. González-Gómez and Gualda 2020). Such an approach is well suited to mapping structures and identifying the driving forces of cooperation, such as key actors. However, there is considerable scope for analysing network evolution more explicitly, including how existing cooperative patterns shape subsequent integration dynamics. As Soeters (1993, 644) already noted long before the application of network analytical methods to cross-border cooperation, 'Networks develop [and] should not be regarded as static, but as dynamic entities.' More recently, Sohn and Giffinger (2015, 1192) have likewise acknowledged that a focus on network structures limits what we can learn about how policy processes unfold over time.

Therefore, there is a strong case for adding a more explicitly dynamic dimension into network analyses of cross-border cooperation. The solution proposed here is to recognise that actors' interdependence in a network creates forms of embeddedness that influence the formation of new ties and the persistence of existing ones (Borgatti et al. 2022; Cranmer, Desmarais, and Menninga 2012). Thus, elements of the network structure itself influence cooperation in future iterations of the network, creating a self-reinforcing dynamic. Cooperation is here defined in network terms: two actors (nodes) are considered to share a tie in any year that they implemented a small project together. In each year, it is therefore possible to observe both the formation of new ties and the persistence of ties that continued from the previous year.

Two network effects are particularly important in analysing dynamics in cooperation. The first can be termed community effects, where cooperation widens from a small group of interconnected nodes to include others (e.g. González-Gómez and Gualda 2020, 116; Kinne 2013). Communities in network terms are subgroups of nodes in a network that are more closely connected to each other – directly or indirectly – compared to other nodes in the network (Bedi and Sharma 2016; Borgatti et al. 2022). As community members are therefore more embedded in the network, they are especially likely to pull in new partners and to form new ties in the future.

The first hypothesis is drawn from these considerations:

H1a: Ties are more likely to form with partners that were members of a community in previous years.

Popularity effects are the second network effect of interest (Berardo and Scholz 2010; Cranmer, Desmarais, and Menninga 2012; Kinne 2013). In a network context 'popularity' refers to an organisation's embeddedness in the network through its ties in a given year. A popular organisation with many ties clearly has the resources, such as the personnel or

the experience, to invest in cooperation and is therefore an attractive partner to other organisations. Such popularity effects are very common in network analysis, where they are operationalised in terms of centrality measures. The most widespread of these is degree centrality, which is defined as the number of ties that a node shares with other nodes (Borgatti et al. 2022).

To test popularity dynamics, a further hypothesis can be defined as follows:

H2a: Ties are more likely to form with partners that have had many cooperative ties in previous years.

Policy networks usually exhibit some fluidity as ties form and dissolve (Scott 2013). However, networks require some continuity to sustain cooperation: completely new ties each year would be at odds with the stated aims of Interreg. While Interreg-funded projects tend to be short-lived, some project partnerships persist (Briot et al. 2021). Persistent ties may indicate network resilience, or the capacity to sustain cooperative functions even in the face of external shocks or disruptions (Desmarais, Harden, and Boehmke 2015, 394). In border regions, resilience similarly depends on the ability of cross-border institutions to adapt to changing circumstances while maintaining cooperation (Prokkola 2019). Conversely, short-lived ties point to more episodic, project-driven cooperation.

For the same reasons that community membership is anticipated to influence new tie formation, it may also influence tie persistence. Community membership is a form of relational embeddedness that should promote tie durability. Equally, popularity and organisational capacity, as captured in degree centrality, incentivise an organisation's partners to maintain ties in order to access resources and continue partnerships.

Two further hypotheses can be derived from these considerations:

H1b: Ties are more likely to persist with partners that were members of a community in previous years.

H2b: Ties are more likely to persist with partners that have had many cooperative ties in previous years.

The limited use of explicitly longitudinal network designs in the literature on cross-border cooperation may at least partially be a data issue. Much existing work has been based on cross-sectional interview or survey data, with very few studies using Interreg projects as indicators of cross-border networking (but see González-Gómez and Gualda 2020; Niavis, Kallioras, and Petrakos 2024). Small projects funds offer a dense sequence of project-based ties over time, but they have so far been an underutilised resource. The next section introduces these SPFs and situates them in their place of origin, the Polish-German border region.

3. Small projects in the Polish-German border region

Longitudinal project data for this paper were collected from the Brandenburg-Poland Interreg programme in the Polish-German border region. It was in this border region that

small projects funds were first conceived, in 1995, to address a post-Cold War deficit in cross-border networks (Jałowicki and Smętkowski 2004). SPFs are micro-grant schemes administered by some Euroregions through umbrella projects that finance small cross-border projects. Designed to foster cross-border integration through civil society networking, SPFs were subsequently copied in Interreg programmes at most Central European and some Western European borders (Mirwaldt 2012).

SPFs co-finance many cross-border activities each year. Cooperation in small projects is easy to begin but also easy to exit once a project has been concluded. As discussed above, project-based cooperation is often short-lived, though repeat collaborations do occur (Szmigiel-Rawska and Dołzbłasz 2012). Overall, therefore, SPFs facilitate experimentation, making them highly suitable for analysing the processes that drive cross-border networking.

The focus here is on small projects carried out in the Euroregion Spree-Neisse-Bober /Sprewa-Nysa-Bóbr under the Brandenburg-Poland programme. Figure 1 shows the location and shape of the Euroregion, together with its principal transport corridors. With an area of 9,793 km² and 860,000 inhabitants (Euroregion Spree-Neisse-Bober n.d.), this is the smallest of the Polish-German Euroregions, though it is comparable in size to Euroregion Pro Europa Viadrina and the Polish-Czech-German Euroregion Neisse-Nisa-Nysa. The fact that the Polish part of the Euroregion is much larger than the German part can create asymmetries in the activity of partners from more peripheral areas (Sarmiento-Mirwaldt and Spree-Neiße-Bober n.d.-a). These asymmetries should make sustained cross-border networking harder to achieve, making this a relatively conservative test case of expectations about network dynamics.

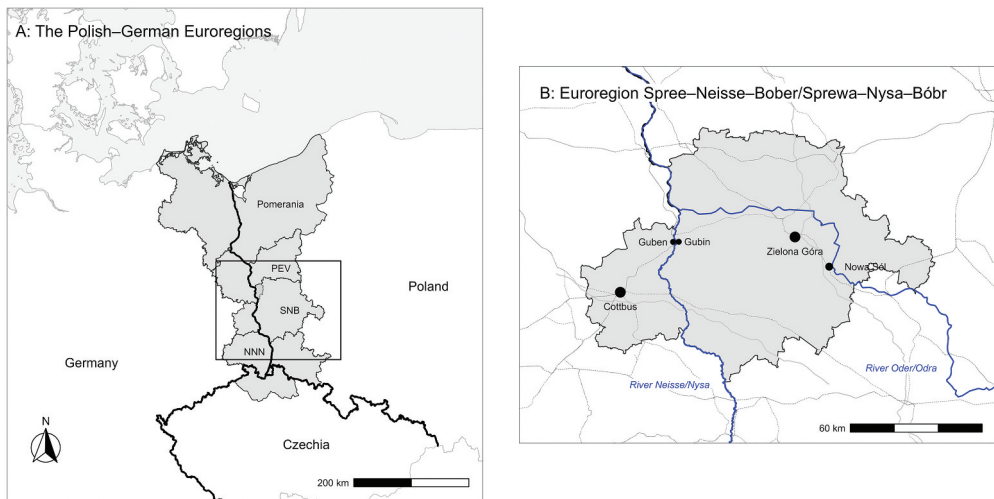


Figure 1. Euroregions along the German-Polish border (author's compilation). Note: Basemap country and subnational boundaries are from GADM (via geodata), except the Polish part of Pomerania which uses Eurostat/GISCO NUTS 3; Euroregion polygons are dissolved from constituent units and mapped in EPSG:3035. Major roads, railways and the River Neisse/Nysa in Panel B are derived from OpenStreetMap; the river Oder/Odra is derived from Natural Earth. Abbreviations: PEV = Pro Europa Viadrina; SNB = Spree-Neisse-Bober/Sprewa-Nysa-Bóbr; NNN = Neisse-Nisa-Nysa.

Euroregion Spree-Neisse-Bober/Spree-Nysa-Bóbr (SNB) was founded in 1993 and named after three rivers. In fact, the river Neisse/Nysa largely coincides with the border in this Euroregion. The Polish side encompasses the town of Zielona Góra, seven districts (*powiaty* Krośnieński, Nowosolski, Świebodziński, Wschowski, Zielonogórski, Żagański, Żarski) and their constituent municipalities, as well as the municipalities Cybinka, Torzym and Zbąszyń. The German side is composed of the town of Cottbus and the district (*Landkreis*) Spree-Neiße. The largest towns in the Euroregion are Zielona Góra on the Polish side and Cottbus on the German side. The next-largest town, Nowa Sól, is considerably smaller. The offices of the Euroregion are located in the twin towns of Guben and Gubin that face each other just across the border.

The Euroregion has been affected by structural change, especially on the German side. It is an old coal mining region where the brown coal production is being phased out. Additional problems include lacking infrastructure, with only five border crossings along the 80 km-long border strip, and limited rail and public transport links (Euroregion Spree-Neisse-Bober 2020b, 135). These issues are compounded by demographic decline, through ageing and the outmigration of well-qualified younger residents (65). At the same time, the Euroregion features a manufacturing base and several universities, as well as ample natural and cultural capital. Against this backdrop, tourism and nature-based development have been identified as growth opportunities, alongside future-oriented technologies such as Artificial Intelligence (74).

Drawn from the border region where the fund was first conceived, the SPF from Euroregion Spree-Neisse-Bober/Spree-Nysa-Bóbr is a useful test case of the hypothesised dynamics. However, these dynamics are not unique to this border region. Although cooperation patterns vary across borders, the underlying theoretical expectation – that current network structures shape future ties – is also testable in other regions, SPFs and project-based cooperation for which longitudinal partner data are available.

Promoting cross-border linkages and networking between civil society actors is one of the explicit goals of the SPF in the Brandenburg-Poland Interreg programme. For example, the 2014–2020 implementation guidelines define one of the objectives of the SPF as ‘creating lasting partnership networks in various fields.’ (Euroregion Spree-Nysa-Bóbr 2020, 3). SPFs co-finance low-cost activities such as workshops, sporting competitions, or joint choir practice. Implementation takes place through projects that are organised by pairs of one Polish and one German organisation.² The bureaucratic requirements of SPFs are lower compared to regular Interreg projects. This makes it easier for civil society actors to draw on these funds (Dołzbłasz 2013, 103), though they must pre-finance any activities from their own resources. Unlike for regular Interreg projects (Niavis, Kallioras, and Petrakos 2024), access to SPFs is not particularly competitive, as Euroregional advice filters out ineligible projects, and decision committees tend to accept those that fulfil the criteria.

Eligible partners include not-for-profit organisations such as regional and local authorities, their subsidiaries, educational institutions, cultural and sporting organisations, charities, and NGOs (Euroregion Spree-Neisse-Bober 2020a). Private for-profit actors are not eligible, in accordance with the fund’s emphasis on civil society cooperation. A distinction is made here between local authorities (i.e. municipalities), other subnational authorities such as district or regional authorities, and non-territorial organisations. While municipalities are a subset of territorial authorities, they deserve special attention: they

often have partnership agreements with municipalities on the other side of the border, as well as dedicated partnership offices with the task of driving cross-border events. Key staff tend to have personal relationships with their counterparts across the border (Frątczak-Müller and Mielczarek-Żejmo 2020, 22). Other territorial authorities, such as German *Kreise* or Polish *powiaty* (districts) likewise engage proactively in cross-border cooperation and usually have the resources to pre-finance projects (cf. Durand and Nelles 2014; Frątczak-Müller and Mielczarek-Żejmo 2020, 19). Both act as hubs that recruit other local actors, such as schools or fire brigades, into project organisation. Whether an organisation is a municipality or higher-level territorial authority, as opposed to a non-territorial organisation, is therefore analytically relevant. It captures differences in administrative capacity and brokerage roles, and often – though not always – coincides with more routinised cross-border partnerships such as formal twinning agreements.

Pairs, or dyads, of one Polish and one German organisation are the basic structure carrying out projects, but these dyads are in turn embedded in a broader network. Some pairs organise projects repeatedly in the same year or over successive years. However, given the multitude of actors in a border region, even the most well-connected organisations will only ever cooperate with a small proportion of all actors that organised a project in the time period covered. The highest number of unique partners any organisation in the dataset accumulated is 24, a number that only Zielona Góra and the ‘German-Polish Club Cottbus’ reached. Overall, SPF-funded cross-border networks are likely to be sparse and fragmented (González-Gómez and Gualda 2020).

Yet, there are good reasons for hypothesising that cooperation spreads through the creation of new ties. Organisations’ decisions are influenced by prior interactions and by the activities of others in the network. For example, awareness of the SPF among eligible organisations may rise because successful events are publicised on web sites, in regional newspapers and in newsletters, in turn making the networking opportunities provided by SPFs more visible. Municipalities or other well-connected organisations may encourage others to develop cooperative ties. And having once organised a project and dealt with the (lower but by no means negligible) bureaucratic hurdles creates a certain procedural knowledge of the fund that makes it easier to organise further projects with new partners.

Equally, though, partnerships may be disrupted. Key individuals such as mayors may change and subsequently de-prioritise cross-border cooperation. Most obviously, the Covid-19 pandemic represented an external shock that tested network resilience because cross-border in-person events were not possible during the ensuing border closures, disrupting established cross-border relations (Kajta and Opiłowska 2022). While the turn-over of personnel can also be a source of renewal (Nelles and Durand 2014, 116), it will inevitably cause some disruption. In general, the influence of past cooperation can be expected to wane after about two years, as institutional memory decays. The next section shows how these considerations are addressed in the data and methods used in this paper.

4. Data and methods

The analysis is based on an original dataset, which comprises the complete set of small projects that were carried out between Polish and German organisations in Euroregion Spree-Neisse-Bober/Sprowa-Nysa-Bóbr. The dataset covers two Interreg periods – Interreg IV and V – spanning the years 2008–2023.³ For each possible dyad of a Polish and

a German organisation, this dataset captures through a dichotomous variable whether they cooperated in a given year.

In this paper, network dynamics are analysed through the community hypotheses (H1a and H1b) and the popularity hypotheses (H2a and H2b). Community membership and degree centrality are measures derived from the overall network. Thus, features of the network structure are of interest as an influence on the behaviour of organisations, namely their choice to cooperate with another organisation on the other side of the border. Inferential network analysis is the ideal tool to capture situations where network influences are the object of analysis. Exponential random graph models (ERGMs) model the probability of a tie given covariates and network-derived measures, allowing the researcher to distinguish actual processes at work in the network from random chance (Borgatti et al. 2022).⁴

To capture dynamics over time, ERGMs have been extended to temporal exponential random graph models (TERGMs), which account for previous realisations of a network influencing the current realisation (Cranmer, Desmarais, and Menninga 2012, 295). TERGMs model continuity from one year to the next by distinguishing between the formation of new ties and the persistence of existing ones. TERGMs can easily handle lagged independent variables, where the features of the network in previous years influence the current state.

As already noted, cooperation can be disrupted by shocks. To visualise any possible disruptions, Figure 2 shows the number of cooperative ties, as well as the amount of Interreg funding dispensed on small projects for every year. A dividing line after 2015 indicates when the last projects from the Interreg IV period ended and the first projects from Interreg V began. The figure shows that there are clear ups and downs. Years at the start and end of a programming period see a significantly lower volume of cooperation than years in the middle of the programming period. The figure also shows that years that were affected by Covid-related border closures, namely 2020 and 2021, saw a lower volume of cooperation than might otherwise be expected in the middle of the programming period, though the high number of ties in 2022 suggests a rebound in activity. It is important to account for these effects in the analysis.

Table 1 summarises the variables included in the empirical models. The edges terms capture the baseline tendency for tie formation and persistence and can thus be interpreted as intercepts. There are two key independent variables that are drawn from the structure of the network: community membership and popularity. To identify the presence of subgroups of closely connected nodes, communities of a size larger than two were detected using the Louvain algorithm (Borgatti et al. 2022), with every node that was a member of such a community in one year being coded as such for that year. Community membership was lagged by one year and two years respectively, as the dynamic effect of community membership is anticipated for future cooperation. The table shows that community membership was rare: across all years, 12% of nodes were members of a community. There was some variation between years, with less than 10% of nodes being members of a community in years of low tie volume but higher ratios of up to 20% in the high-volume years 2017 and 2018.

Degree centrality measures the number of cooperative ties of each node and can thus be interpreted as a measure of popularity. Degree centrality was here normalised by

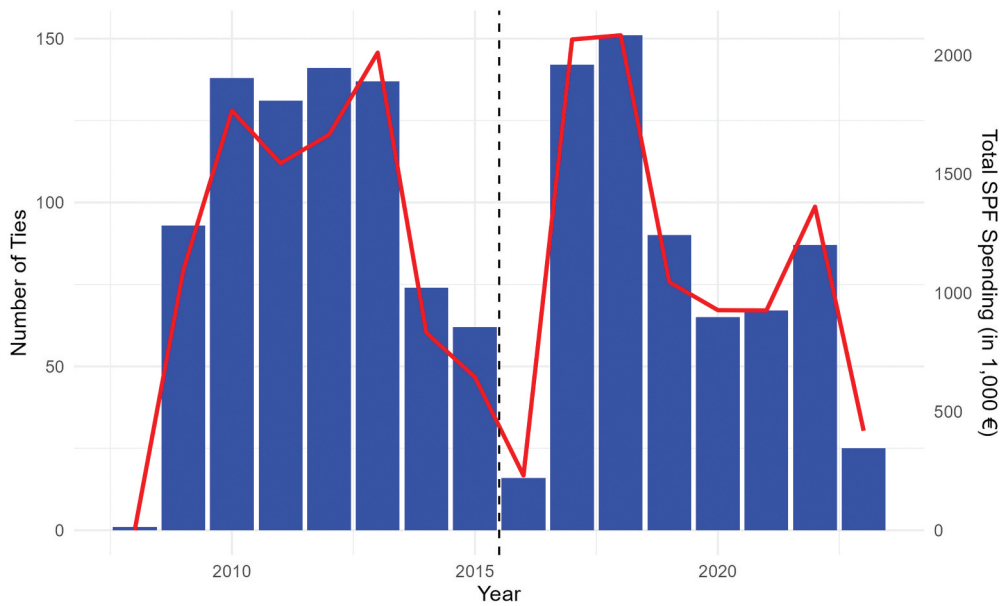


Figure 2. Number of ties and SPF funds spent per Year.

Table 1. Variables in the Model.

Variable	Level	Measure	Measurement range and summary statistics	Expected effect
Edges (tie formation)	Network	Overall propensity for new ties to form between nodes unconnected in the previous year	–	–
Edges (tie persistence)	Network	Overall propensity for ties persisting from one year to the next	–	–
Community membership (H1a and H1b)	Node	Lagged dichotomous variable indicating whether a node was a member of a community in that year	0, 1 Total 1: 1,005 (ranging from 9 in 2016 to 128 in 2017 and 2018) Total 0: 8,307 (ranging from 511 to 630)	+
Popular organisation (H2a and H2b)	Node	Lagged normalised degree centrality of a node in that year	0–1 Overall mean: 0.002 Overall SD: 0.006	+
Municipality	Node	Time-invariant dichotomous variable indicating whether a node is a municipality	0, 1 0: 552 1: 87	+(control)
Other territorial organisation	Node	Time-invariant dichotomous variable indicating whether a node is a higher-level territorial organisation	0, 1 0: 624 1: 15	+(control)
Distance	Dyad	Time-invariant geographical distance in km between two nodes	0–1,464 Mean: 102.45 SD: 90.48 Median: 89.10	–(control)
Same country	Dyad	Supplement to distance, to identify dyads from the same country and thus limit the effect of distance to Polish-German pairs	0, 1 0: 102,024 1: 101,817	none (control)

dividing it by the number of nodes in the network. This was done so that the values all fall between 0 and 1, a consistent scale for all years that ensures comparability (Borgatti et al. 2022, 97). Normalised degree centrality is very low, with an observed maximum of 0.154 in 2016 and an overall mean of no more than 0.002. As with community membership, degree centrality was lagged by one year and two years respectively. 2008 had to be discarded from the analysis because there was only one project in that year. Therefore, the cooperation data used as the dependent variable start in 2011, with networks from 2009 and 2010 serving to construct lagged covariates.

Table 1 also shows the control variables. First, this includes a time-invariant dichotomous variable indicating whether an organisation is a municipality. As shown in Section 3, municipalities are potentially very important as drivers of cooperation, which merits a special measure to identify their influence in the analysis. 87 organisations, or 14% of all nodes in the network, fulfil this criterion. Second, higher-level territorial organisations, such as districts or regions are also important as public bodies that may recruit organisations on their territory into project organisation. An additional 15 territorial organisations were coded as such in an additional control variable. Furthermore, the physical distance between Polish and German organisations in kilometres is included as a time-invariant dyad-level measure. Longer distances are likely to increase the transaction costs of organising SPF activities that usually take place in person, and distance has been shown to constrain Interreg partnership formation (Errico et al. 2024). These effects may muddy those of the key independent variables of interest and are therefore controlled for.⁵

5. Results

Table 2 displays the results for the period from 2011 to 2023 while incorporating lagged variables that capture network structures from the preceding years (e.g. 2009 and 2010 for 2011 as the first modelled year). The table shows two forms of network behaviour: the formation of ties that did not exist in the previous year, and the persistence of ties that continued from the previous year. Model 1 is the baseline model that shows only the effect of the control variables on tie formation and tie persistence. Model 2 is the full model. Models 3–6 present different combinations of variables in the tie persistence term. The measures of goodness-of-fit suggest that Models 4 and 5 are the best-fitting models that balance parsimony with explanatory power. From among these, Model 5 is preferred here because it covers both tie formation and tie persistence.

Table 2 shows that the propensity to form or maintain a tie is very low: there are fewer cooperative ties than one would expect by chance alone, as indicated by a consistently negative value for the edges parameters. This is in line with expectations. As noted above, cross-border SPF networks can generally be expected to be very sparse, due to the sheer number of actors in them, most of which an organisation will never develop ties with.

Most importantly, the table shows that network position predicts new ties well but is much less successful in predicting tie persistence. The lags of community membership and of degree centrality show positive effects on tie *formation*, in line with H1a and H2a. Embeddedness in a subgroup in the previous year or two years earlier predisposes organisations to form new ties. Having had many ties in the previous year has a similar effect, but the effect of past embeddedness through numerous ties dissipates quickly, after one year. Tie *persistence*, in contrast, is more difficult to model. The full Model 2

Table 2. TERG models.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Tie formation						
Edges	−7.85* (0.08)	−8.44* (0.09)	−8.44* (0.09)	−8.44* (0.09)	−8.44* (0.09)	−8.44* (0.09)
Community _{t-1}		0.26* (0.09)	0.26* (0.09)	0.26* (0.09)	0.26* (0.09)	0.26* (0.09)
Community _{t-2}		0.35* (0.10)	0.35* (0.10)	0.35* (0.10)	0.35* (0.10)	0.35* (0.10)
Degree centrality _{t-1}		35.47* (7.19)	35.47* (7.19)	35.47* (7.19)	35.47* (7.19)	35.47* (7.19)
Degree centrality _{t-2}		10.59 (6.34)	10.59 (6.34)	10.59 (6.34)	10.59 (6.34)	10.59 (6.34)
Municipality	0.88* (0.07)	0.42* (0.08)	0.42* (0.08)	0.42* (0.08)	0.42* (0.08)	0.42* (0.08)
Other territorial organisation	1.41* (0.11)	1.02* (0.12)	1.02* (0.12)	1.02* (0.12)	1.02* (0.12)	1.02* (0.12)
Distance	−0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Same country	−17.78 (168.47)	−17.62 (164.72)	−17.62 (164.72)	−17.62 (164.72)	−17.62 (164.72)	−17.62 (164.72)
Tie persistence						
Edges	−0.65* (0.13)	−1.00* (0.16)		−0.65* (0.13)	−0.96* (0.16)	−0.93* (0.16)
Community _{t-1}		0.12 (0.14)			0.23* (0.10)	
Community _{t-2}		0.23 (0.14)			0.13 (0.10)	
Degree centrality _{t-1}		11.93 (9.93)				18.12* (7.21)
Degree centrality _{t-2}		−10.31 (8.29)				−3.45 (6.32)
Municipality	0.44* (0.08)	0.33* (0.09)		0.44* (0.08)	0.34* (0.09)	0.33* (0.09)
Other territorial organisation	0.14 (0.15)	0.08 (0.17)		0.14 (0.15)	0.00 (0.16)	0.04 (0.16)
Distance	−0.00 (0.00)	−0.00 (0.00)		−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Same country	NA	NA		NA	NA	NA
Goodness-of-fit metrics						
BIC	12116	11952	11945	11909	11924	11928
PR-AUC (general)	0.196	0.199	0.207	0.199	0.194	0.199
PR-AUC (tie formation)	0.009	0.008	0.010	0.009	0.009	0.009
PR-AUC (tie persistence)	0.034	0.031	0.038	0.037	0.037	0.031
Mean degree (observed/simulated)	0.473/ 0.413	0.473/ 0.413	0.473/ 0.565	0.473/ 0.413	0.473/ 0.410	0.473/ 0.413
Mean reachability (observed/simulated)	0.012/ 0.012	0.012/ 0.008	0.012/ 0.018	0.012/ 0.012	0.012/ 0.008	0.012/ 0.007
Mean component size (observed/ simulated)	1.291/ 1.253	1.291/ 1.253	1.291/ 1.385	1.291/ 1.255	1.291/ 1.255	1.291/ 1.253

Note: Estimated using conditional maximum likelihood estimation. Standard errors in brackets. * $p < 0.05$.

includes both network measures – past community membership and past degree centrality – and shows them to have no meaningful effect. Despite an occasional positive effect of one of these variables in Models 5 and 6, this is not consistent enough to support H1b or H2b.

Figures 3 and 4 visualise tie formation dynamics using the example of new ties in 2019 and 2013 respectively. Figure 3 displays newly-formed ties in 2019, with nodes shaded in darker colours if they were a member of a community in the previous year (2018, Panel A) or two years prior (2017, Panel B). To facilitate tracing over-time dynamics, identical nodes

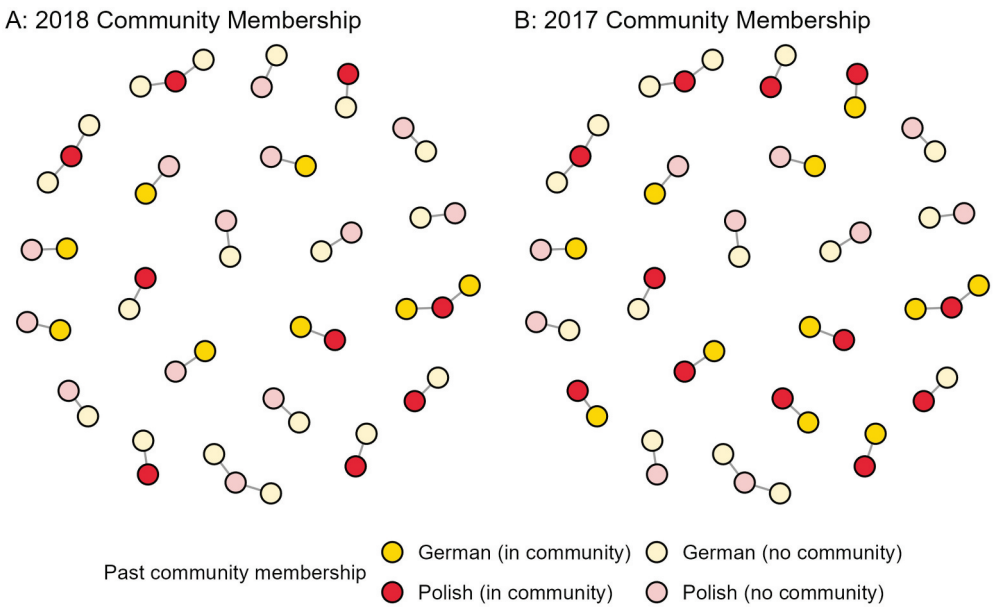


Figure 3. New ties in 2019 and past community membership.

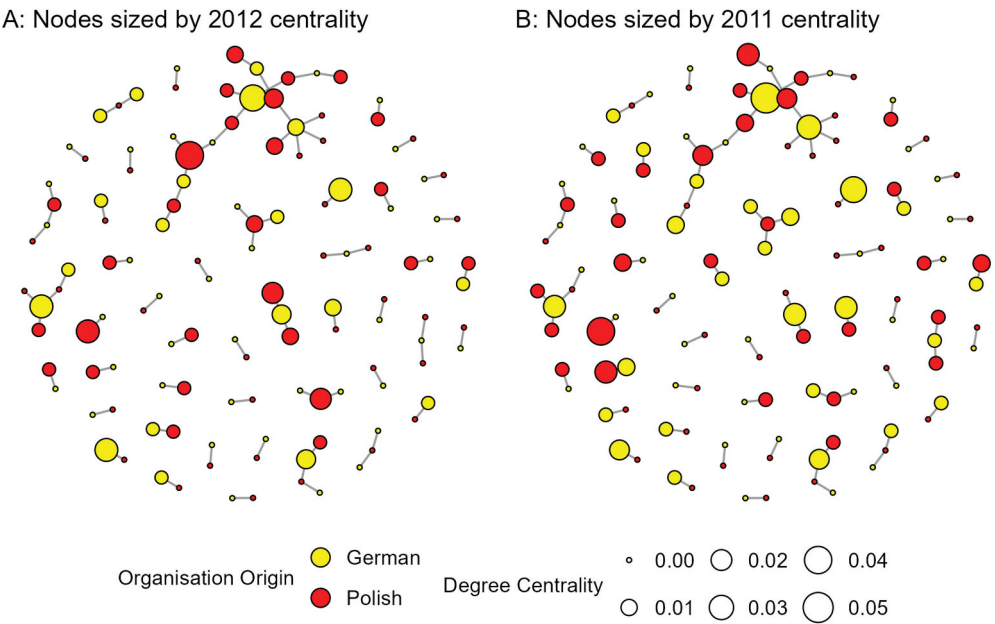


Figure 4. New ties in 2013 and past centrality.

are placed in the same position in both panels. The figure shows that a majority of new ties involved at least one member of a past community in either or both of the previous years. And while the figure shows several ties between nodes that were not community members, members were disproportionately involved in new ties, compared to their

overall presence in the network. The figure therefore illustrates the earlier statistical finding that prior community membership is associated with a higher likelihood of forming new ties even after two years.

Figure 4 visualises newly-formed ties in 2013 and shows the continuity of central actors across years. It indicates that actors with a high past popularity play an important role in new tie formation, even though this effect is robust only in the short term. The nodes are sized according to their degree centrality in 2012 (Panel A) and 2011 (Panel B). The figure shows that several ties formed between nodes that had few ties in previous years, but it also shows that most dyads, and all but one of the larger clusters, involved organisations with a higher past degree centrality. More than a third of nodes in Panel A have an above-average past popularity.

As for the control variables, Table 2 shows that, despite previous theoretical insights, geographical distance does not have any effect in any of the models. In contrast, municipal and other territorial organisations play a positive role in tie formation across all models. This means that ties are more likely to form if they involve a municipality or higher-level territorial organisation, such as a district or a region. This confirms some findings from previous research, which suggest that territorial authorities are prominent in cross-border cooperation (Durand and Nelles 2014; Frątczak-Müller and Mielczarek-Żejmo 2020, 19). But only municipal involvement sustains cooperation: in the models of tie persistence, municipalities emerge as an important factor. Higher level territorial authorities do not, though this could be because municipalities are far more numerous than higher-level authorities, so estimates for the latter are less precise.

As shown in Figure 2, there was a much lower volume of cooperation in years that were afflicted by Covid as well as years near the end of a programming period or the start of a new one. The models presented in Table 2 do not distinguish between high-cooperation years, such as 2012 or 2018, and those affected either by Covid or by a programme transition. To account for this, separate models were run for the pre-Covid (2011–2019) and Covid/post-Covid (2020–2023) periods as well as the years preceding the transition from Interreg IV to Interreg V (2011–2014) and those after the transition but before the transition to Interreg VI (2017–2022). Table 3 displays these models, as well as repeating the results of Model 5 for comparison.

As in Model 5, past degree centrality predicts tie formation in all sub-period models, but the effect dissipates after one year. This reinforces the earlier point that popularity matters, but only in the short term. Equally, ties are generally more likely to form when they involve a municipal or higher-level territorial authority. However, only the involvement of municipalities has a positive effect on tie persistence, whereas the involvement of a higher-level territorial organisation does not, again mirroring the previous findings from Table 2.

For community membership, only the pre-Covid model shows the same patterns as those in Model 5.⁶ The pre-Covid model, like Model 5, shows that past embeddedness in the shape of community membership and popularity, has a positive effect on tie formation but not on tie persistence. Once the analysis is restricted to shorter sub-periods, the community effect becomes much less consistent. This suggests that its influence is concentrated in particular phases of network development. This interpretation fits the descriptive pattern of community membership, which is comparatively high in the early years (17–19% in 2011–2013), drops sharply in the years around the programme transition

Table 3. TERG models accounting for different periods.

	Model 5	Pre-Covid (2011– 2019)	Post-Covid (2020– 2023)	Pre- transition (2011–2014)	Post- transition (2017–2022)
Tie formation					
Edges	–8.44* (0.09)	–8.32* (0.10)	–8.56* (0.22)	–8.12* (0.16)	–8.44* (0.14)
Community _{t-1}	0.26* (0.09)	0.37* (0.10)	–0.22 (0.24)	0.41* (0.16)	–0.13 (0.17)
Community _{t-2}	0.35* (0.10)	0.35* (0.11)	0.36 (0.25)	0.05 (0.19)	0.26 (0.18)
Degree centrality _{t-1}	35.47* (7.19)	30.77* (8.06)	51.11* (17.68)	40.08* (12.22)	36.19* (13.23)
Degree centrality _{t-2}	10.59 (6.34)	10.58 (7.16)	15.98 (14.90)	7.26 (11.47)	18.63 (11.05)
Municipality	0.42* (0.08)	0.51* (0.09)	0.07 (0.20)	0.53* (0.13)	0.31* (0.14)
Other territorial organisation	1.02* (0.12)	0.95* (0.14)	1.30* (0.26)	0.45 (0.25)	1.27* (0.19)
Distance	0.00 (0.00)	0.00 (0.00)	–0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Same country	–17.62 (164.72)	–17.43 (168.34)	–17.18 (310.84)	–16.79 (188.67)	–16.71 (177.36)
Tie persistence					
Edges	–0.96* (0.16)	–1.03* (0.19)	–0.93* (0.39)	–1.28* (0.30)	–0.55* (0.21)
Community _{t-1}	0.23* (0.10)	0.19 (0.12)	0.34 (0.26)	0.08 (0.17)	0.51* (0.16)
Community _{t-2}	0.13 (0.10)	0.16 (0.12)	0.07 (0.26)	0.38* (0.17)	0.04 (0.16)
Municipality	0.34* (0.09)	0.32* (0.10)	0.46* (0.22)	0.39* (0.15)	0.31* (0.13)
Other territorial organisation	0.00 (0.16)	0.09 (0.19)	–0.28 (0.39)	0.36 (0.27)	–0.35 (0.24)
Distance	–0.00 (0.00)	0.00 (0.00)	–0.00 (0.00)	0.00 (0.00)	–0.00 (0.00)
Same country	NA	NA	NA	NA	NA
Goodness-of-fit metrics					
PR-AUC (general)	0.196	0.191	0.213	0.211	0.219
PR-AUC (tie formation)	0.009	0.040	0.016	0.026	0.066
PR-AUC (tie persistence)	0.034	0.028	0.055	0.149	0.122
Mean degree (observed/simulated)	0.473/ 0.413	0.282/0.410	0.232/0.444	0.232/0.410	0.050/0.454
Mean reachability (observed/simulated)	0.012/ 0.012	0.003/0.007	0.003/0.008	0.030/0.007	0.002/0.014
Mean component size (observed/simulated)	1.291/ 1.253	1.162/1.253	1.129/1.275	1.129/1.253	1.026/1.281

Note: Estimated using conditional maximum likelihood estimation. Standard errors in brackets. * $p < 0.05$.

(10% in 2014, 7% in 2015, and 1% in 2016), rebounds in 2017–2018 (20% in both years), and is lower again in the Covid years (9% in 2020–2021). Against this backdrop, it is plausible that disruption during Covid itself further weakened community structures, making community membership a less reliable predictor of new tie formation in the post-Covid period.

Turning to tie persistence, the sub-period models indicate that the splits affect how community effects can be detected. In the full-period Model 5, the association between past community membership and persistence is weak. When the data are split around Covid, the relationship is not clearly detectable in either sub-period. This is consistent with the fact that this periodisation yields shorter windows and does not align neatly with

periods of relatively stable community embeddedness. In contrast, when the split follows the Interreg programme transition, community membership is associated with tie persistence in specific phases, albeit at different lags. Overall, the split models suggest that embeddedness translates into durable cooperation only in certain phases of network evolution, and that splits aligned with programme cycles are more likely to reveal these persistence effects than splits that cut across them.

6. Discussion

The central argument of this paper is that, if cross-border cooperation is understood as one of the mechanisms through which European integration takes shape in border regions, then analysing it dynamically becomes essential. Much of the existing network analytical literature on cross-border cooperation is based on cross-sectional or time-aggregated approaches. By design, these approaches do not focus explicitly on network evolution. This is why a longitudinal perspective adds a distinct contribution. This paper therefore treats cross-border cooperation as an evolving process, by modelling tie formation and persistence as distinct dynamics over time.

The paper demonstrates how prior network embeddedness shapes subsequent tie formation. Overall, two network effects were found to be crucial in the evolution of cooperative dynamics: prior community membership and high degree centrality were both associated with the formation of new cooperative ties. In network terms, community membership signifies embeddedness in a densely connected sub-group, while degree centrality captures embeddedness through numerous recent ties and the visibility that accompanies them. Together they suggest that new SPF ties emerge more easily among organisations embedded in existing communities and recently active organisations. These effects are dynamic because they link prior network position to subsequent tie formation, which in turn contributes to the evolution of future community structures and degree centrality. However, the effect of degree centrality dissipates quickly, implying that partner attractiveness is tied to recent engagement rather than longer-run prominence.

While the analysis confirmed the anticipated effect of network structure on tie formation, work remains to ascertain the factors that influence tie persistence. A complete SPF dataset spanning two funding periods will necessarily contain many ties that were only ever designed to run as a single project. Equally, there will be many smaller clubs or associations that cease cooperating through the SPF altogether, possibly because the bureaucratic effort connected with the fund remains considerable for smaller organisations (Sarmiento-Mirwaldt and Spree-Neiße-Bober [n.d.-b](#)). The presence of such short-lived ties in the network will dilute underlying influences on tie persistence. Future research could relax the assumption of strictly year-to-year tie formation and capture longer-term cooperative patterns.

Tie persistence is a particularly challenging outcome to explain because it treats one-off collaborations the same as partnerships that were designed to recur. In this respect, the prominence of municipalities in the persistence models is noteworthy, even though municipal and higher-level territorial organisations were here included only as controls. Municipalities are especially likely to draw on institutionalised partnerships (e.g. through twinning agreements) that outlast a single project, whereas many smaller associations

may collaborate only sporadically. Future research could therefore focus on municipal actors and distinguish between enduring, interrupted, and reactivated partnerships. This would capture persistence as routine, institutionalised cooperation rather than as a year-to-year continuity.

The period splits suggest that the network mechanisms identified here depend on different stages in network evolution. The Covid split captures a disruption in which overall cooperation declined but then recovered. This recovery suggests resilience, potentially helped by the efforts of the Euroregion itself (AEBR [n.d.](#)), and is consistent with wider discussions of resilience in border regions (Prokkola 2019). At the same time, the disruption appears to have weakened community structures that were previously associated with new tie formation. In contrast, the programme-transition split aligns more closely with shifts in how SPF activity fluctuates across the funding cycle, making community effects on persistence more visible. Taken together, the split models therefore suggest that external shocks and programme transitions shape whether embeddedness translates into durable cooperation.

The empirical focus in this paper has been on a small projects fund in the Polish-German border region over two Interreg funding periods. Network dynamics were observed in Euroregion Spree-Neisse-Bober/Sprowa-Nysa-Bóbr, a relatively small, structurally transforming Euroregion. However, the finding that network structures predict future cooperation is unlikely to be unique to this region. While different local contexts will have an important influence on cooperation patterns, the relational mechanisms identified here are likely to operate in other cross-border settings where cooperation takes place through repeated interactions among identifiable actors. Studying these mechanisms in different contexts would therefore be a worthwhile endeavour.

Methodologically, this paper has shown that temporal exponential random graph models are a powerful but underused tool for analysing the evolution of territorial cooperation. This opens up new avenues for research into how networked cooperation evolves, including the role of different actor types, the conditions under which ties persist or dissolve, the resilience of networks to external shocks, and how period-specific contexts shape cooperative dynamics.

The finding that cooperation in Interreg-supported networks is driven in part by structural network properties matters for European integration because networks are not only mechanisms through which Interreg programmes are implemented but also one of their explicit aims. Rather than identifying a smooth deepening of integration, the findings reveal that integration is a dynamic configuration of ties that evolves unevenly over time, with phases of consolidation and reconfiguration shaped by network structure, programme rhythms, and disruption.

7. Conclusion

This paper analysed cross-border cooperation in small projects funds as part of the broader European integration process. It did so by using longitudinal project data from the Euroregion Spree-Neisse-Bober/Sprowa-Nysa-Bóbr across two Interreg funding periods.

The analysis shows that past network embeddedness is associated with the formation of new cross-border ties, whereas tie persistence is much harder to explain through the

same network mechanisms. This pattern is consistent with the project-based nature of SPF cooperation, in which many partnerships are designed to be time-limited, and year-to-year models capture longer-term cooperative partnerships only imperfectly.

These findings support a more dynamic understanding of cross-border cooperation in which past network configurations shape subsequent cooperation. This matters for European integration because Interreg does not merely fund projects; it aims to foster durable cross-border linkages. The evidence presented here suggests that subgroups and well-connected actors facilitate the emergence of new cooperation, but that durability follows a different logic: it depends less on uninterrupted year-to-year continuation than on programme rhythms, actor types, and other factors such as the degree of institutionalisation, and it can therefore strengthen or weaken over time as programme contexts and external conditions change.

Future research should therefore examine how institutionalisation, organisational capacity, and programme design shape network evolution. It should also test whether the same relational mechanisms identified here generalise to other Euroregions and cooperation programmes. This points to the value of moving from network structure to network evolution in cross-border cooperation research.

Notes

1. Euroregions are cross-border associations of municipalities and higher-level territorial organisations, such as districts, that promote cross-border cooperation and networking.
2. A small number of projects are carried out by more than two partners. In the dataset, these were split into Polish-German pairs. An even smaller number of projects are carried out by cross-border European Groupings of Territorial Cooperation, in which case they do not require an additional partner. These were discarded from the dataset, as their projects are not relational.
3. Interreg IV ran between 2007 and 2013, while Interreg V ran between 2014 and 2020. As project work under Interreg programmes usually begins a year or two years after the start of the period and continues for up to two years beyond the end of the programme (three for Interreg V to make up for the Covid disruption), the years noted above are those for which actual projects have taken place.
4. ERGMs model the probability of observing the given network with the observed ties, as opposed to another hypothetical network from a distribution of possible networks with the same number of nodes (Cranmer, Desmarais, and Menninga 2012, 293; Cranmer, Desmarais, and Morgan 2021). In addition to turning network dependencies into a source of theoretical interest, ERGMs can handle the well-known problem of the 'explosiveness' of dyadic data, or the number of *possible* dyads. All possible combinations of 327 German organisations and 312 Polish organisations in the dataset amount to 102,024 dyads. Multiplying this by 16 years yields more than 1.6 million observations. In regression analysis, such large numbers of observations tend to produce artificially low standard errors because the dyads are not independent observations, which increases the danger of incorrectly rejecting a null hypothesis. ERGMs handle this problem by making the network in any given year the dependent variable.
5. Calculating the effect of distance as a time-invariant dyad attribute requires a full set of distances, including those between same-country pairs. However, there are no same-country ties in the dataset because Polish-Polish or German-German projects are not allowed as per SPF rules. This problem was mitigated by including a dichotomous variable that identifies same-country dyads. This variable is useful only to isolate the effect of

distance between Polish and German organisations as a properly-specified control variable.

6. Most measures of goodness-of-fit deteriorate due to the loss of statistical power that comes with the exclusion of four years' worth of data.

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Data availability statement

The data and R code that support the findings of this study are openly available in Figshare at <https://doi.org/10.17633/rd.brunel.28652204>.

Ethics and integrity

No research on human participants was carried out for this project.

References

- AEBR (Association of European Border Regions). n.d. "Border Regions Experiences with COVID-19 (part 2)." Accessed July 11, 2025. <https://www.aebr.eu/contribution-from-aebr-members-other-actors-cor-platform-on-covid-19/>.
- Bedi, P., and C. Sharma. 2016. "Community Detection in Social Networks." *WIREs Data Mining and Knowledge Discovery* 6 (3): 115–135. <https://doi.org/10.1002/widm.1178>.
- Berardo, R., and J. T. Scholz. 2010. "Self-Organizing Policy Networks: Risk, Partner Selection, and Cooperation in Estuaries." *American Journal of Political Science* 54 (3): 632–649. <https://doi.org/10.1111/j.1540-5907.2010.00451.x>.
- Blatter, J. 1997. "Explaining Crossborder Cooperation: A Border-Focused and Border-External Approach." *Journal of Borderlands Studies* 12 (1–2): 151–174. <https://doi.org/10.1080/08865655.1997.9695502>.
- Borgatti, S. P., M. G. Everett, J. C. Johnson, and F. Agneessens. 2022. *Analyzing Social Networks Using R*. London: Sage.
- Briot, N., E. Boulineau, L. Coudroy de Lille, and L. Vaudor. 2021. "Mapping International Cooperation Between European Cities: A Network Analysis of the Interreg C and Urbact Programs." *Cybergeog: European Journal of Geography*. <https://doi.org/10.4000/cybergeog.37538>.

- Cranmer, S. J., B. A. Desmarais, and E. J. Menninga. 2012. "Complex Dependencies in the Alliance Network." *Conflict Management and Peace Science* 29 (3): 279–313. <https://doi.org/10.1177/0738894212443446>.
- Cranmer, S. J., B. A. Desmarais, and J. W. Morgan. 2021. *Inferential Network Analysis*. Cambridge: Cambridge University Press.
- Decoville, A., and F. Durand. 2021. "An Empirical Approach to Cross-Border Spatial Planning Initiatives in Europe." *Regional Studies* 55 (8): 1417–1428. <https://doi.org/10.1080/00343404.2021.1902492>.
- Desmarais, B. A., J. J. Harden, and F. J. Boehmke. 2015. "Persistent Policy Pathways: Inferring Diffusion Networks in the American States." *The American Political Science Review* 109 (2): 392–406. <https://doi.org/10.1017/S0003055415000040>.
- Dolzbłasz, S. 2013. "Cross-Border Co-Operation in the Euroregions at the Polish-Czech and Polish-Slovak Borders." *European Countryside* 5 (2): 102–114. <https://doi.org/10.2478/euco-2013-0007>.
- Dörry, S., and A. Decoville. 2016. "Governance and Transportation Policy Networks in the Cross-Border Metropolitan Region of Luxembourg: A Social Network Analysis." *European Urban and Regional Studies* 23 (1): 69–85. <https://doi.org/10.1177/0969776413490528>.
- Durand, F., and C. Lamour. 2014. "Cross-Border Metropolitan Governance: The Multi-Faceted State Power." *Space and Polity* 18 (3): 197–214. <https://doi.org/10.1080/13562576.2014.957041>.
- Durand, F., and J. Nelles. 2014. "Binding Cross-Border Regions: An Analysis of Cross-Border Governance in Lille-Kortrijk-Tournai Eurometropolis." *Tijdschrift voor Economische en Sociale Geografie* 105 (5): 573–590. <https://doi.org/10.1111/tesg.12063>.
- Errico, F., A. Corallo, A. Spennato, and G. E. Berlingiero. 2024. "Spatial Proximity versus Social Distance: Partnership Development in the Cross-Border Cooperation." *Journal of the Knowledge Economy* 15 (1): 461–486. <https://doi.org/10.1007/s13132-022-01077-9>.
- European Commission. 2021. *Border Regions: Living Labs of European Integration*. Brussels: European Commission. 14 July 2021 COM(2021) 393 final.
- European Commission. n.d. "Interreg: European Territorial Co-operation." https://ec.europa.eu/regional_policy/policy/cooperation/european-territorial_en. Accessed February 3, 2025.
- Euroregion Spree-Neisse-Bober. 2020a. "Umsetzungsrichtlinie für den Klein-Projekte-Fonds (KPF) der Euroregionen PRO EUROPA VIADRINA und Spree-Neiße-Bober." <https://euroregion-snb.de/files/folder.32/1-umsetzungsrichtlinie-kpf-2021-2027.pdf>. Accessed September 9, 2025. [Implementation Guidelines for the Small Projects Fund (SPF) of the Euroregions PRO EUROPA VIADRINA and Spree-Neiße-Bober].
- Euroregion Spree-Neisse-Bober. 2020b. "Vision 2030: Entwicklungs- und Handlungskonzept für die Jahre 2021 – 2027." <https://euroregion-snb.de/files/folder.28/ehk-2030-de.pdf>. Accessed February 27, 2026. [Vision 2030: Development and operational strategy for the years 2021–2027].
- Euroregion Spree-Neisse-Bober. n.d. "Team." <https://euroregion-snb.de/Team>. Accessed February 28, 2026.
- Euroregion Sprewa-Nysa-Bóbr. 2020. "Wytyczne dla Funduszu Małych Projektów (FMP) realizowanego przez Euroregiony PRO EUROPA VIADRINA i Sprewa-Nysa-Bóbr", 3rd version dated 1 January 2020." https://euroregion-snb.pl/media/wytyczne_fmp_01_01_2020_r_.pdf. Accessed August 9, 2024. [Guidelines for the Small Projects Fund (SPF) implemented by Euroregions PRO EUROPA VIADRINA and Sprewa-Nysa-Bóbr].
- Frątczak-Müller, J., and A. Mielczarek-Żejmo. 2020. "Networks of Cross-Border Cooperation in Europe—The Interests and Values. The Case of Spree-Neisse-Bober Euroregion." *European Planning Studies* 28 (1): 8–34. <https://doi.org/10.1080/09654313.2019.1623972>.
- González-Gómez, T., and E. Gualda. 2020. "Disclosing the Relational Structure of Institutional Cross-Border Cooperation in Two Cross-Border Regions in Europe." *Journal of Borderlands Studies* 35 (1): 113–129. <https://doi.org/10.1080/08865655.2017.1399810>.
- Harguindéguy, J. B. 2007. "Cross-Border Policy in Europe: Implementing INTERREG III-A, France–Spain." *Regional & Federal Studies* 17 (3): 317–334. <https://doi.org/10.1080/13597560701543717>.
- Interreg Bayern-Tschechien. 2022. "Interreg Bayern - Tschechien Programmdokument 1." Version CCI-Nr. 2021TC16RFCB008. https://www.by-cz.eu/fileadmin/user_upload/interreg/downloads/

- downloads_21-27/Dokumente_zur_Programmgenehmigung/Programmdokument_BY-CZ_1.Version-17.03.2022.pdf. Accessed February 12, 2025. [Interreg Bavaria - Czechia programming document].
- Interreg Brandenburg-Polen 2014-2020. 2014. "Kooperationsprogramm INTERREG V A Brandenburg – Polen 2014–2020 im Rahmen des Ziels 'Europäische territoriale Zusammenarbeit' des Europäischen Fonds für regionale Entwicklung (EFRE), Potsdam, 18. Dezember 2014 – genehmigt durch die Europäische Kommission am 21." Oktober 2015. https://interregva-bb-pl.eu/wp-content/uploads/2020/04/Kooperationsprogramm_4.1-2.pdf . Accessed March 6, 2025. [Cooperation programme INTERREG V A Brandenburg – Poland 2014-2020].
- Jałowiecki, B., and M. Smętkowski. 2004. "Małe projekty Euroregionalne." In *Współpraca Transgraniczna Unii Europejskiej: Doświadczenia Polsko-Niemieckie*, edited by G. Gorzelak, J. Bachtler, and M. Kasprzyk, 277–293. Warsaw: Wydawnictwo Naukowe Scholar [Small Euroregional projects].
- Kajta, J., and E. Opilowska. 2022. "The Impact of Covid-19 on Structure and Agency in a Borderland. The Case of Two Twin Towns in Central Europe." *Journal of Borderlands Studies* 37 (4): 699–721. <https://doi.org/10.1080/08865655.2021.1996259>.
- Kinne, B. J. 2013. "Network Dynamics and the Evolution of International Cooperation." *The American Political Science Review* 107 (4): 766–785. <https://doi.org/10.1017/S0003055413000440>.
- Mirwaldt, K. 2012. "The Small Projects Fund and Social Capital Formation in the Polish–German Border Region: An Initial Appraisal." *Regional Studies* 46 (2): 259–272. <https://doi.org/10.1080/00343404.2010.490210>.
- Nelles, J., and F. Durand. 2014. "Political Rescaling and Metropolitan Governance in Cross-Border Regions: Comparing the Cross-Border Metropolitan Areas of Lille and Luxembourg." *European Urban and Regional Studies* 21 (1): 104–122. <https://doi.org/10.1177/0969776411431103>.
- Niavis, S., D. Kallioras, and G. Petrakos. 2024. "The Distributional Characteristics of Interreg Transnational Programmes and Their Role in Promoting Regional Cohesion." *Papers in Regional Science* 103 (6): 100057. <https://doi.org/10.1016/j.pirs.2024.100057>.
- Prokkola, E. K. 2019. "Border-Regional Resilience in EU Internal and External Border Areas in Finland." *European Planning Studies* 27 (8): 1587–1606. <https://doi.org/10.1080/09654313.2019.1595531>.
- Sarmiento-Mirwaldt, K., and Euroregion Spree-Neiße-Bober. n.d.-a. "Analyse der deutsch-polnischen Partnerschaften 2007-Juli 2017 erstellt im Rahmen des Projektes #Partner2022 - Ausbau der grenzüberschreitenden Partnerschaftsarbeit in der Euroregion Spree-Neiße-Bober." <https://euroregion-snb.de/neue-seite-10>. Accessed March 21, 2025. [Analysis of Polish-German partnerships 2007-July 2017 prepared within the framework of the project #Partner2022 - Expansion of cross-border partnership work in the Euroregion Spree-Neisse-Bober].
- Sarmiento-Mirwaldt, K., and Euroregion Spree-Neiße-Bober. n.d.-b. "Analyse zu den eingeschlafenen Partnerschaften und weißen Flecken erstellt im Rahmen des Projektes #Partner2022 - Ausbau der grenzüberschreitenden Partnerschaftsarbeit in der Euroregion Spree-Neiße-Bober." <https://euroregion-snb.de/neue-seite-10>. Accessed February 27, 2026. [Analysis of dormant partnerships and white spots prepared within the framework of the project #Partner2022 - Expansion of cross-border partnership work in the Euroregion Spree-Neisse-Bober].
- Scott, J. C. 2013. "Social Processes in Lobbyist Agenda Development: A Longitudinal Network Analysis of Interest Groups and Legislation." *Policy Studies Journal* 41 (4): 608–635. <https://doi.org/10.1111/psj.12034>.
- Scott, J. W. 1999. "European and North American Contexts for Cross-Border Regionalism." *Regional Studies* 33 (7): 605–617. <https://doi.org/10.1080/00343409950078657>.
- Setti, A. 2025. "No Fences, Good Neighbors: Measuring and Explaining Integration in European Cross-Border Regions." *Journal of European Integration* 47 (5): 753–774. <https://doi.org/10.1080/07036337.2024.2418293>.
- Soeters, J. L. 1993. "Managing Euregional Networks." *Organization Studies* 14 (5): 639–656. <https://doi.org/10.1177/017084069301400502>.

- Sohn, C., and R. Giffinger. 2015. "A Policy Network Approach to Cross-Border Metropolitan Governance: The Cases of Vienna and Bratislava." *European Planning Studies* 23 (6): 1187–1208. <https://doi.org/10.1080/09654313.2014.994089>.
- Sousa, D. L. 2013. "Understanding European Cross-Border Cooperation: A Framework for Analysis." *Journal of European Integration* 35 (6): 669–687. <https://doi.org/10.1080/07036337.2012.711827>.
- Svensson, S., and C. Nordlund. 2015. "The Building Blocks of a Euroregion: Novel Metrics to Measure Cross-Border Integration." *Journal of European Integration* 37 (3): 371–389. <https://doi.org/10.1080/07036337.2014.968568>.
- Szmigiel-Rawska, K., and S. Dołzbłasz. 2012. *Trwałość współpracy przygranicznej*. Warsaw: CeDeWu [The durability of cross-border cooperation].
- van Houtum, H. 2000. "III European Perspectives on Borderlands: An Overview of European Geographical Research on Borders and Border Regions." *Journal of Borderlands Studies* 15 (1): 56–83. <https://doi.org/10.1080/08865655.2000.9695542>.
- Walther, O., and B. Reitel. 2013. "Cross-Border Policy Networks in the Basel Region: The Effect of National Borders and Brokerage Roles." *Space and Polity* 17 (2): 217–236. <https://doi.org/10.1080/13562576.2013.817515>.