Opening Closure: Intercohesion and Entrepreneurial Dynamics in Business Groups*

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What is a social group across time in network terms? Conventional network models are static and force a parsing of cohesive groups into exclusive communities. We develop a network analysis that recognizes cohesive groups dynamically while recognizing multiple membership synchronically. Instead of locating entrepreneurship outside cohesive groups in structural voids, we demonstrate the entrepreneurial potential of intercohesive positions. We chart business group evolution for a national economy across an entire epoch of economic and political transformation. We analyze the network evolution of personnel ties among the largest 1,696 Hungarian enterprises, identifying cohesive groups and the factors that explain their stability, embedding, and group performance from 1987 to 2001. Exclusively cohesive groups are buffered from revenue decline, but are not likely to achieve high performance. Enterpreneurial intercohesion contributes to higher group performance, but at the risk of group instability.

Business groups are an important feature of modern economies, whether in the developed or developing worlds. To economic sociologists, the existence of business groups suggests that, in some contexts, the actual unit of economic action is less the isolated firm than a network of firms (DiMaggio 2001). Several decades of research have yielded insights on how business groups buffer their member firms from uncertainty (Ahmadjian and Lincoln 2001), coordinate business strategy, secure financing and channel investments, interface with the political field (Siegel 2007), and promote and diffuse innovation (Powell et al 2005). Researchers have carried out comparative studies of variation in the structure of business groups across national economies (Hamilton and Biggart 1988; Guillen 2001) and studied the impact of foreign direct investment on business network ties (Kogut and Walker 2001). Yet, despite Granovetter's lament, more than a decade ago, about "the paucity of literature on the growth and evolution of business groups" (Granovetter 1994: 466), no researchers have conducted a systematic study, based on yearly, longitudinal data, of the dynamics and evolution of business groups for an entire national economy. Our study takes on this challenge, examining the rise, growth, and evolution of business groups in postsocialist Hungary for an entire period of political and economic transformation. To do so, we analyze the network evolution of personnel ties among the largest 1,696 Hungarian enterprises from 1987-2001, identifying the distinctively cohesive groups formed by dense ties among them and modeling the factors that explain cohesive group stability, network embedding, and economic performance.

Our study contributes to a new agenda in economic sociology of developing a dynamic, historical network analysis (Stark and Vedres 2006). Padgett and McLean (2006), for example, develop a multiple network approach to study the genesis of the banking form over some eighty years in Renaissance Florence. Powell, White, Koput, and Owen-Smith (2005) apply a dynamic network approach to understand the emergence of biotechnology, following ties between more than two thousand organizations over a twelve year period. And Uzzi and Spiro (2005) examine network properties of cohesion and connectivity among a population of 2,092 people who worked on 474 Broadway musicals from 1945 to 1989. Whereas these path breaking studies, using large datasets across relatively long time frames, focus on particular industries (banking, biotech, and Broadway), we focus on the evolution of business groups among and across the industries of an entire national economy.

We consider historical network analysis as providing a new vantage point from which to re-examine the essence or constitution of "groupness" itself. What is a social group across time in network terms? The conventional group snapshot of network analysis does not distinguish robust and stable collectivities from transitory alignments; it only enables the researcher to distinguish network regions of greater or lesser density. Within that conventional framework, it is tempting to consider denser regions as cohesive structures where strong forces of structural determination hold members together. Once we think of groups as histories of cohesion, however, we can move away from ideas of determining structures, and start seeing groups as sites and tools of agency (Sewell 1992). Group members are not only constrained by cohesive group bonds but, instead, act as strategic agents that can destabilize and disaggregate groups as well as realign and re-aggregate new groupings. A social group in time is both a constraint and an opportunity for action, and its life is a result of agency. A group is born when members' actions pull it together, and it dissolves when members' actions destabilize it.

To understand the structural evolution of business groups, we engage the central concepts of cohesion and connectivity rooted in the original insights of network analysis but revitalized through new methods of network dynamics (Moody and White 2003; Uzzi and Spiro 2005). We argue, first, for a network analysis that addresses not only the structural properties of cohesion but its temporal properties – durability, persistence, or stability – as well. Thus, we propose new methods to ascertain cohesion as structure over time. We argue, second, for a network analysis that recognizes multiply cohesive positions (Moody and White 2003). Instead of a forced methodological parsing of separated islands of cohesion, we identify a distinctive network structure, intercohesion, at the intersection of mutually interpenetrating, cohesive structures. To do so, we adopt methods recently developed in physics specifically designed to chart the evolution of groups in a large network context (Palla, Derenyi, Farkas, and Vicsek 2005; Palla, Barabasi, and Vicsek 2007). We demonstrate that these methods are a closer match to the original sociological motivations for studying and understanding group dynamics than alternative methods developed within social network analysis.

We thus propose a network analysis that recognizes cohesive group structures dynamically while recognizing multiple cohesive group membership synchronically. Our goal is to advance concepts and methods for the study of the topographical and the temporal properties of cohesive group stability.

Within this framework of dynamic and possibly interpenetrating business groups, we propose to rethink the relationship between business group cohesion and entrepreneurship. The prevailing consensus in network analysis suggests an opposition between the constraints of network embeddedness and opportunities for entrepreneurial creativity. While, on one hand, network ties are seen as a medium of trust that lubricates economic action and prevents the potentially paralyzing contractual formulation of all aspects of economic transactions, on the other, deep embeddedness is seen to be detrimental to entrepreneurial performance (Uzzi 1997). Along these lines, Granovetter (1995) argues that business groups need to be somewhat decoupled from denser social networks to reach higher performance. Current thinking in economic sociology thus equates entrepreneurial success with the exploitation of brokerage opportunities. Such opportunities are limited within cohesive groups and, therefore, entrepreneurs do best to stay outside such dense regions, spanning structural holes between them (Burt 1992).

Instead of locating entrepreneurship outside cohesive groups in structural voids, we demonstrate the entrepreneurial potential of intercohesive positions. Consistent with the notion of entrepreneurship as resource recombination (Schumpeter 2003), we argue that entrepreneurship in the business group context occurs at the intersection of cohesive groups where actors have familiar access to diverse resources available for recombination. While exploring structural locations of entrepreneurial creativity within the densest regions of cohesion, we are also attentive to the potentially destructive effects of novel entrepreneurial combinations (Schumpeter 1975 [1942]). Groups combined might also become groups destroyed.

Postsocialist Hungary offers a rich laboratory to examine the evolution of business groups, explore the dynamics of entrepreneurship, and identify the factors explaining cohesive group stability. The dislocations and uncertainties facing state-owned enterprises undergoing privatization, new startups, and foreign-owned subsidiaries can hardly be overstated: With the collapse of COMECON (the Soviet-bloc inter-state trading system) following the demise of the Soviet Union, many firms faced the almost total collapse of their once-guaranteed markets; waves of bankruptcy swept through the economy, in many cases eliminating the suppliers and customers of the firms that survived; the institutional and regulatory environment was highly uncertain with hundreds of new pieces of legislation and administrative decrees whose enforcement was still not predictable; and government strategy regarding privatization, debt forgiveness, banking regulations, corporate taxation, antitrust, and so on shifted within administrations almost as much as across the electoral cycle in which incumbents were defeated in every parliamentary election (1990, 1994, and 1998) in the period we study.

In this context, the new institution of corporate supervisory bodies and boards of directors offered firms reliable sources of information, access to insider knowledge of successes and failures elsewhere in coping with challenges, and a mechanism for coordinating actions among strategic business allies. Required by corporate law, the institution was entirely novel to Hungarian executives. CEOs and other senior managers whom we interviewed recalled their puzzlement on attending their first board meeting; but they also emphasized how quickly firms grasped the possibility of sharing directors as an opportunity for coordinating strategy.

To study the dynamics of group formation and entrepreneurship, we have collected the names of all economic officeholders in Hungary from 1987 to 2001, defining economic officeholders as all senior managers and members of the boards of directors and supervisory boards of the largest 1,696 companies. With this list of 72,766 names and the precise dates of the tenure of officeholding, we can construct the personnel ties connecting these largest firms for each year in our study. Our case reaches back to the first moments when firms could adopt the newly-legalized, corporate form. It includes periods of business uncertainty involving privatization, transformational recession, marketization, the institutionalization of economic regulations, and massive foreign direct investment (FDI) as well as three parliamentary elections.

Our analysis indicates that the intercohesive position of multiple cohesive group membership is not a structural anomaly but is a recurring entrepreneurial strategy with real gains and real risks for the groups of which they are members. Specifically, we find that intercohesion contributes to group instability. But the tensions and ambiguities of multiple group membership represent a form of creative disruption – for we also find that intercohesion contributes to the generation of broader network embeddedness and leads to higher group performance as measured by growth in revenue. Whereas exclusively cohesive stable groupings were more likely to be buffered from losing markets, groups with overlapping membership were more likely to reach outstanding revenue growth. That is, cohesive group stability protects from decline but does not promote high growth. Intercohesion, by contrast, does not buffer against decline but is a strong predictor of high growth.

We proceed by first outlining our conceptual agenda for a dynamic analysis of cohesion with overlapping group affiliations. This agenda reaches back with one hand to the founding impetus of studying social groups while reaching out with the other to connect to recent developments in historical sociology and methodological advances in physics. After formulating our expectations about the relationships between group overlap, membership dynamics, network embedding, and performance, we introduce our methods and data. Then, at the group level, we analyze how overlapping memberships affect group stability, embeddedness, and performance. In the subsequent section we zoom out from groups as the unit of analysis to focus on larger lineages of cohesive groups – emergent structural-historical units above the group level – to demonstrate how the tensions of creative destruction at the group level are mitigated at a higher level.

WHAT IS A SOCIAL GROUP IN TIME?

The study of group solidarity is arguably the oldest tradition in sociology. That tradition extends to social network analysis in the study of cohesive structures. For contemporary network analysts, cohesion refers to a relational structure where members are linked by dense ties to each other – as when actors A and B, who are linked to actor C, are also linked to each other. Even when all ties are not closed, the density of ties among the members of the group, it is argued, promotes effective monitoring, mutual understanding, shared expectations, solidarity, and trust.

Cohesion has not always been defined, however, in such structural, or topographical, terms. The predecessors of network analysis gave prominence to temporality over topography in a clear emphasis on duration. In one of the founding studies of the field, Moreno and Jennings (1937:371), for example, defined cohesion as "the forces holding the individual within the groupings in which they are." In this emphasis they echoed Simmel, whose publication in an early issue of the *American Journal of Sociology* was titled, "The Persistence of Social Groups" (Simmel 1898). Whereas at mid-century Festinger, Schachter, and Back (1950:164) would define cohesion in their study of social pressures in informal groups as "the total field of forces which act on members to remain in the group" (see McPherson and Smith-Lovin 2002 and Friedkin 2004 for discussion), by the century's turn structural properties had trumped durational features in network analysts' conception of cohesion.

The relative lack of attention to the problem of the persistence, or stability, of cohesive group structures is curious because network analysts typically argue that cohesion fosters communication, predictability, and most importantly, trust. The development of trust is a process that involves mechanisms of reciprocation; and, unlike spot market transactions which can take place at a moment in time, reciprocity can only occur across time. Trust and predictability require repeated interactions. Cohesive structures promote trust only if they persist. In arguing that cohesive structures foster trust, network analysts thus use a conception of cohesion that implies duration – not simply a structure of cohesively dense ties at one moment in time but some degree of stability across time. Yet studies of cohesion are typically based on static, cross-sectional snapshots of networks in which temporality is not a component of the analysis. That is, conventional social network analysis assumes that stability across time is a direct function of structure at a moment in time. If the durational properties of cohesion are to be ascertained and not simply assumed, we need analytic tools in which conceptualization and method address both the structural and the temporal properties of cohesive group stability.

From static to dynamic analysis of business groups

Whereas early studies of personnel ties in the US economy were motivated to demonstrate the existence of an integrated business class and later focused on cohesive structures constituting an "inner capitalist core" (Useem 1980), research outside the United States brought a very different dimension to the study of inter-enterprise networks. Instead of demonstrating the integration or cohesive core of a business *class*, research on Western Europe, Latin America, and especially East Asia pointed to the existence of discrete business *groups*. Inter-enterprise networks such as the Japanese *keiretsu* or the South Korean *chaebol* brought banks together with firms in heavy industry and consumer goods to reallocate resources and coordinate strategy in competition with other networks of banks and firms on domestic and international markets. In this view, network ties facilitated not class integration but collaboration and coordination within the business group for competition with other groups (Hamilton and Feenstra 1995; Ahmadjian and Lincoln 2001).

Like this second generation of studies on interorganizational corporate networks, our research also focuses on distinctive groups. But studying business groups in the postsocialist context poses special challenges for the network analyst. Unlike the East Asian cases, where Japanese *keiretsu* and South Korean *chaebol* are registered entities, business groups in Hungary do not exist as named places on the business landscape. To meet this challenge, we identify groups by building upon and refining the core network analytic concept of cohesion. We define a group as a contiguous local region of cohesion with a distinctive topography in which each member must be connected to at least three other members in the cohesive group. Starting with this conception of business group as a local region of cohesion, we identify the factors that explain the dynamics of cohesive group stability with data covering the time frame of a transformative epoch.[1]

Moving from a cross-sectional to a dynamic concept of group cohesion significantly raises the stakes as it immediately poses a central sociological problem: How can we identify a group across time? Can it change its composition and still be "the same" group? The problem is simple where groups are named, catalogued, and registered, e.g., the Supreme Court, the Youngstown Garden Club, the Mitsubishi *keiretsu*, or the Samsung Group. Despite membership changes over a century, the Department of Sociology at the University of Chicago remains such because of institutional continuity. But the social networks forming Hungarian corporate groups, like many if not most of the groups studied by network analysts, lack such institutionalization. How do we study group stability where groups are not named?

1 Studies of interorganizational networks in the United States have not traced director interlocks back to the historical foundings of corporations and their first boards of directors. Researchers of East Asian business groups do extend analysis back to the ruptures of the Second World War and the Korean war (Kim 1997); but these descriptive accounts have not involved large, longitudinal datasets to chart changes on a yearly basis from the outset.

In his "Persistence of Social Groups" Simmel offers a key insight in noting that it is meaningful to speak of group identity despite shifting membership and low institutionalization if there is some membership continuity in contiguous stages:

> We may express this schematically as follows: If the totality of individuals or other conditions in the life of the group be represented by *a*, *b*, *c*, *d*, *e* ; in a later moment by *m*, *n*, *o*, *p*, *q* ; we may nevertheless speak of the persistence of identical selfhood if the development takes the following course: *a*, *b*, *c*, *d*, *e* – *m*, *b*, *c*, *d*, *e* – *m*, *n*, *c*, *d*, *e* – *m*, *n*, *o*, *d*, *e* – *m*, *n*, *o*, *p*, *e* – *m*, *n*, *o*, *p*, *q*. In this case each stage is differentiated from the contiguous stage by only one member, and at each moment it shares the same chief elements with its neighboring moments (Simmel 1989: 670-1).

We draw on this insight. For the first year of our dataset we use an algorithm to identify each of the cohesive groups of firms (cohesive group 1 composed of firms *a,b,c,d,e*; cohesive group 2 composed of *m,n,o,p,q*; and so on). For the second year we identify the cohesive groups existing at that time (following Simmel, call them, *m,b,c,d,e*; *a,n,o,p,q*; *v,w,x,y,z*; and so on.) Because network formation is slow at first and the number of groups appearing at the very beginning is only very small, we somewhat modify Simmel's scheme. Instead of simply following the first established groups, we identify all the groups that exist from 1987-2001. That is, we identify and record, for each year, all of the cohesive groups that exist in that year. By observing the composition of all groups in t_1 and those in t_2, we can record the proportion of the members of any given group that remained cohesively tied (our metric of stability) for all pairs of years.

Simmel is a hard act to follow. But we want to follow him to raise the stakes yet again. In his study, *The Web of Group Affiliations*, Simmel famously observed that groups were frequently not exclusive. The fact that a person could be a member of more than one cohesive group was a source both of individuation for the person and of social integration for the larger collectivities involved. If Simmel's insight is correct, for a given year, we should expect to find, with some frequency, groups of the following composition, adopting his nomenclature: *f,g,h,i,j* and *w,x,h,y,z* – where *h* is simultaneously a cohesive insider to both groups. In our population of firms we might find, for example, a power plant linked in a cohesive group with other power plants, while also cohesively tied with power distributors and coal mines, linked in a different cohesive group with other heavy industry companies, and associated in a group with banks and financial or service firms.

Thus, to follow Simmel consistently we need a method that recognizes cohesive group stability dynamically while recognizing multiple cohesive group membership synchronically.

Intercohesion

If topography replaced temporality in their definitions of cohesion, social network analysts have adopted a restricted topography that models cohesive structures as exclusive. Whereas actual network structures can be composed of overlapping cohesive groups, the typical clustering algorithms used by network analysts parse cohesive structures into separated communities with a resulting blindspot to multiple group membership. Here, too, current practice departs from founding statements in the field. Although network analysts frequently cite Simmel's classic, *The Web of Group-Affiliations* ([1922] 1964), his attention to "overlapping group affiliations" has largely disappeared from contemporary analyses of cohesion. [2]

In his article on the social group concept, for example, Linton Freeman asserts that overlapping only occurs between groups from different social contexts (such as work, kinship, and friendship), and once the context is clarified, there is little, if any, overlap (Freeman 1992). We argue that partitioning social networks into disjunctive social groups is artificial, driven more by limitations of methodological vision than by sociological insight. Joint appointments in academic departments constitute an overlap of two or more departmental groups. Nuclear families form as the overlap of maternal and paternal kinship groups. It is not exceptional to participate in more than one circle of friends. A more realist perspective acknowledges that social groups can be cohesive and overlapping.

To grasp the peculiarity of the structural position that is at the intersection of two cohesive groups we will use the term "intercohesive location" as more conceptually precise than the descriptive term "overlapping." To date, social network analysis has neglected intercohesive dynamics, focusing instead on processes that we refer to as intra-cohesion and extra-cohesion. *Intra-cohesive* processes involve endogenous dynamics internal to a social group. Reciprocation, resource reallocation, increasing or decreasing prominence of group members, etc. are intracohesive processes. *Extra-cohesive* processes involve exogenous forces outside groups that might have bearing on their formation and development: The appearance or disappearance of a broker as a passage point to other groups might affect information flows to the group; an increasingly sparse network around the group might leave members more reliant on one another; the appearance of a competing group might lure members away, leading to the shrinking of the group; a disintegrating group in the neighborhood might channel new members into the group.

Cohesive groups are typically thought of as separated islands of high density connected by bridging ties (as in small worlds) or by bridging nodes (as in brokerage). *Intercohesive* processes differ from bridging and brokering. The latter concepts both assume a separation between the inside and the outside of groups. They are extra-cohesive mechanisms of linking groups. Bridging can only have as much impact on cohesive groups as a two-step path length. Members of bridged groups are at best friends

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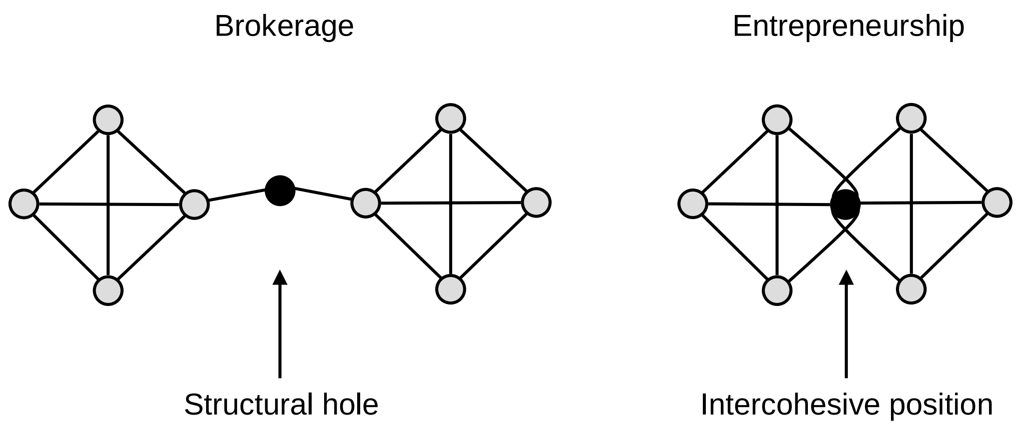
2 As a notable exception, McPherson and Smith-Lovin (2002) do conceptualize the space of overlapping affiliations, but their attempt is largely outside a network analytic framework.

of friends. The strength of impact between groups is limited by the weak ties that are between them. By contrast, whereas bridges and brokers are outsiders to cohesive groups, actors at the intercohesive position are insiders. And because the intercohesive position is inside two or more groups, it brings groups into interpenetrating contact. Intercohesive processes that act through shared members thus operate within a more complex topography. Such permeable cohesion is not a merging or simple combination of two groups. Like brokerage, the intercohesive position of multiple members is distinctive. But whereas the ties that brokers maintain to group members are necessarily weak, intercohesive positions are multiply cohesive (see Figure 1). Whereas actors at the structural hole occupy a brokerage position at the gap, intercohesive actors occupy an entrepreneurial position at the overlap.[3]

Figure 1. Brokerage and entrepreneurship



The importance of intercohesion lies in the fact that it is an intersection of social structures. Such intersection points are locations of structural tension where multiple routines of operation and schemas to organize resources are at work. As prominent locations of restructuring agency, such intersecting social structures can be engines of social change from within (Sewell 1992).

Intercohesion and stability. Our attention to cohesive group stability and to intercohesive ties gives rise to our first research question: What are the effects of multiple group membership on the dynamics of cohesive group stability? Actors who are members of multiple cohesive groups can benefit from this non-exclusive belonging. They receive insider, tacit information from multiple communities, and they have a distinctive vantage point to observe group dynamics in two or more communities. With a portfolio of solidarities they can engage in hedging strategies, using resources in multiple ways and shifting attention from one group to another, both equally known and familiar. While actors at the intercohesive position can exploit such opportunities, other members of the group can also benefit in access to information and experiences through the

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3 See Stark (forthcoming) for an expanded development of a conception of entrepreneurship at the overlap in diverse research settings.

multiply insider. But these benefits (for actor and for group) come with a potential cost. Those with multiply cohesive attachments might seem to follow strategies that are not transparent to those with single membership, leading to coordination difficulties. In the face of the ambiguous loyalties of the intercohesive actors, other members might suspect they are being exploited or manipulated; and lack of commitment and time devoted to a given group by multiple members might lead to group level dysfunction, perhaps even fracture and fragmentation. Thus, intercohesion might come with the cost of cohesive group instability.

Stability and embedding. Stability, however, might come with the cost of overly localized embedding. By embedding we refer to the connectivity of a group to other groups, whether through overlapping cohesive memberships or by other ties not involving cohesion. Whereas *cohesion* refers to intra-group connectedness, *embedding* refers to inter-group connectivity (Moody and White 2003). (We refine and elaborate the precise definitions of cohesion and embedding in sections below.) Embedding matters because groups that are robustly tied to many other groups can benefit from access to greater diversity of information, ideas, developments, and experiences. Thus, our second research question, twinned with the first, asks what factors explain group embedding and, more specifically, whether and how cohesive group stability contributes to or limits group embedding.

Group performance. If intercohesion risks group stability, does it have tangible benefits to group members that would offset these risks? An increased embedding of de-stabilized groups is probably an insufficient motivation to invest in multiple group membership. If such multiply cohesive positions are locations of entrepreneurial action, then we also expect to see a higher growth of revenues in those groups that have a higher number of overlaps. Our third research question thus concerns intercohesion as enabling entrepreneurial recombination through creative destruction , and asks whether the benefits of such strategies have measurable impact on group performance.

DATA AND METHODS

Data

The dataset that we have assembled includes the complete histories of personnel ties among the largest enterprises in Hungary spanning the years 1987-2001. We define large firms as those listed in the annual ranking of the top 500 firms (based on revenue) for any year from 1987 to 2001. Our inclusion rule results in a population of 1,696 firms. This population of firms represents more than a third of employment, about a half of Hungarian GDP, and almost all of export revenues (Figyelõ 2002).

We define *economic officeholders* as senior managers and members of the Board of Directors and the Supervisory Boards of these large enterprises. Personnel data on economic officeholders were transcribed directly from the official files of the 20 Courts of Registry where Hungarian firms are obliged to register information about ownership and personnel. These registry files contain the names and home addresses of all managers that have signatory rights (entitled to sign documents that become legally binding on the firm). They also register the members of the Board of Directors and the Supervisory Board. For each firm we have recorded the names of all signatories and board members who held office in the period studied, recording as well the exact entry and exit dates of their office holding. Our data set on economic officeholders contains 72,766 names.

Beyond economic officeholders, we have also collected the names of all *political officeholders* in Hungary during this same epoch. For the period from 1990-2001, we define political officeholders as every elected politician from the Prime Minister, to the Members of Parliament, to the mayors of all municipalities, including as well the top three levels in the hierarchy of the national government ministries (encompassing cabinet ministers and their political and administrative deputies). Data on political and government officeholders were collected from the National Bureau of Elections (which holds records on all elected political officeholders) and from the Hungarian News Agency (which maintains records on all government officials entering or exiting office). For the period prior to free elections, we define political officeholders as all members of the Politburo and the Central Committee of the Hungarian Socialist Workers Party, as well as government ministers and their deputies.[4] Names of political officeholders in these years from 1987-89 were gathered from a comprehensive CD-rom publication (Nyírő and Szakadát 1993) covering the political elite under state socialism. For all periods we record the party affiliation of each officeholder and the exact dates of tenure in office. Our data set on political officeholders in the entire period from 1987-2001 contains 16,919 names. By merging the lists of economic and political officeholders, for any given enterprise in any given month, we can precisely identify whether that company had an economic officeholder who was also a current or former political officeholder affiliated with a particular political party.

We define a *personnel tie* between two companies if a manager or a board member of one company sits on the board of another company. We record personnel ties as symmetrical, with a start and end date for each tie. The models in this study use an annual time resolution, with personnel ties recorded at the last day of each year. We define a firm as having a *political affiliation* when one of its economic officeholders is also a current or former political officeholder,[5] and we record the party affiliation of that political officeholder as the party affiliation of the firm. Political affiliations are thus personnel ties connecting firms and parties.[6]

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4 Whereas the Communist Party's Central Committee is analogous to the parliament of the subsequent democratic period, the Politburo was akin to the role of the government in the later period.

5 The motivation to include former as well as current political officeholders comes from our interviews with managers of large firms. As one CEO noted: "In Hungary there is no such thing as an ex-politician. Once a politician, always a politician."

6 We do not record a personnel tie between two firms when the tie is created by a political officeholder. Two firms might invite the same politician or ministry official to sit on their boards,

For each firm we also collected data on its annual revenues, capitalization, employment, industrial classification, privatization history, and types of owners (state, domestic private entity, or foreign owner).

Identifying cohesive groups with the Clique Percolation Method

To identify cohesive groups we adopt a method that starts from cohesive localities, recognizes groups independent of the global network environment, and identifies intercohesive positions. We use the clique percolation method (CPM) developed by physicists to uncover the overlapping community structure of complex networks (Palla et al 2005), recently demonstrated as a suitable tool to analyze the evolution of cohesive groups (Palla, Barabasi, and Vicsek 2007).

The clique percolation method starts from a clique of *k* nodes, a *k*-clique. In social network analysis, cliques were often rejected as a useful metric of cohesion because they can highly overlap with other cliques. For example, a network of ten nodes can have two cliques of nine that have eight nodes at their overlap. The standard way of resolving this problem was to parse cohesion by recording the number of times two nodes co-participated in cliques. Use of this similarity as input for cluster analysis yielded exclusive, non-overlapping cohesive regions in the network (Wasserman and Faust 1994).

Whereas standard modeling partitions cohesion at the global network level by counting similarities at the node level, CPM is grounded in strictly local properties at the clique level. Instead of regarding clique overlap as a problem to overcome, it regards clique overlap as the starting point for identifying cohesion. Specifically, it operates on clique adjacency. *K*-cliques are adjacent if they share *k*-1 vertices. A clique of four is adjacent to another clique of four if they share three members. From adjacencies one can assemble a clique chain, traversing along clique adjacencies. The union of all *k*-cliques in such a chain form a *k*-clique percolation cluster if no more *k*-cliques can be added. This contiguous and highly cohesive region of the network is a cohesive group, within which a *k*-clique can percolate, or roll along, by always replacing only one of the *k* nodes. Using a *k* value of four, as we do in this study, yields cohesive groups where all members have ties to at least three other members in the group (see Methodological Appendix A for details).

Although developed by physicists, the method improves on standard approaches in social network analysis and resonates with new departures from the conventional models. Most importantly for our purposes, a group identified by the CPM method can overlap with

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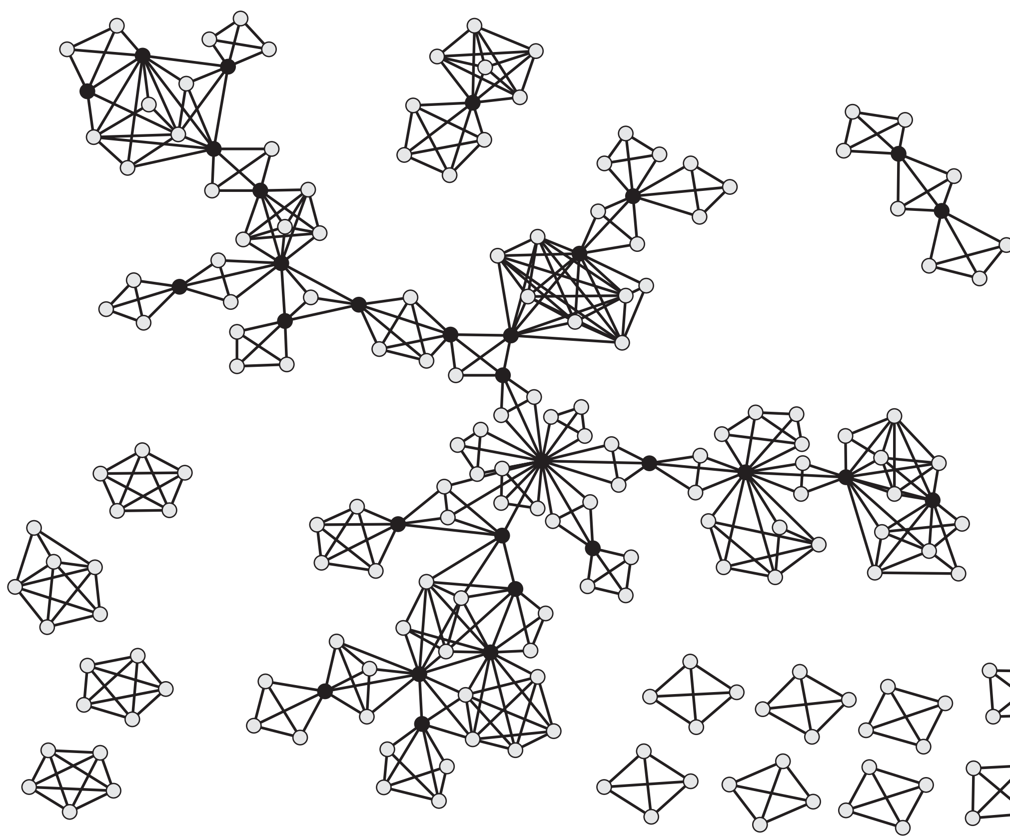
not because they wish to establish a tie to one another, but because they seek a political and/or government connection. Political affiliations are about personnel ties between parties and firms and not between firms. Including a personnel tie between these firms would introduce noise in the data that would potentially blur the patterns of personnel ties created to foster business collaboration.

another group. CPM is thus in line with Everett and Borgatti (1998) who recognized the limitations of forced partitioning in various algorithms and pointed to the utility of clique adjacency as a theoretical solution.[7] By relaxing clique membership in favor of clique adjacency, hence capturing group overlaps, CPM achieves greater sociological realism allowing for closer approximation to the notion of community than does the concept of a sociometric clique. In a social community – unlike in a network clique – everyone is not necessarily connected to everyone else.

We use CPM to identify groups in all years in our dataset from 1987 to 2001. Figure 2 presents the groups and their overlaps identified by our method for a representative year, 1995. How prevalent is group overlapping? Of the 53 groups that are identified for this year, only 12 are exclusive, i.e., not overlapping with other groups. On average, a group overlaps with two other groups, and the highest number of overlaps is eight.

Figure 2. Groups identified by the Clique Percolation Method in the 1995 network.



Note: Light nodes are members of only one group, while dark nodes are members of two or more groups, occupying intercohesive positions.

[7] As Everett and Borgatti demonstrate, a network of 21 nodes can have as many as 2,187 cliques. The prevalence of overlapping in this case is clearly a far departure from what we would think of as meaningful group processes.

INTERCOHESION, GROUP STABILITY, AND GROUP EMBEDDING

Intercohesion and Group stability

We turn now to examine the effects of intercohesion on group stability. For a given group we measure intercohesion as the number of groups with which it overlaps through shared membership. To measure the stability of groups we record the flow of members between all groups in adjacent years. A group is completely stable from year one to year two if all members of the group identified in the first year appear together in a group in the next year. At the other extreme, a group dissolves if none of the members at t_1 appears in any groups at t_2. Between these extremes, a group at t_1 can split into various sized pieces that are present in groups at t_2. To measure such intermediate levels of stability we score the average size of the pieces from t_1 that appear in groups at t_2, normalizing for the size of the source group.

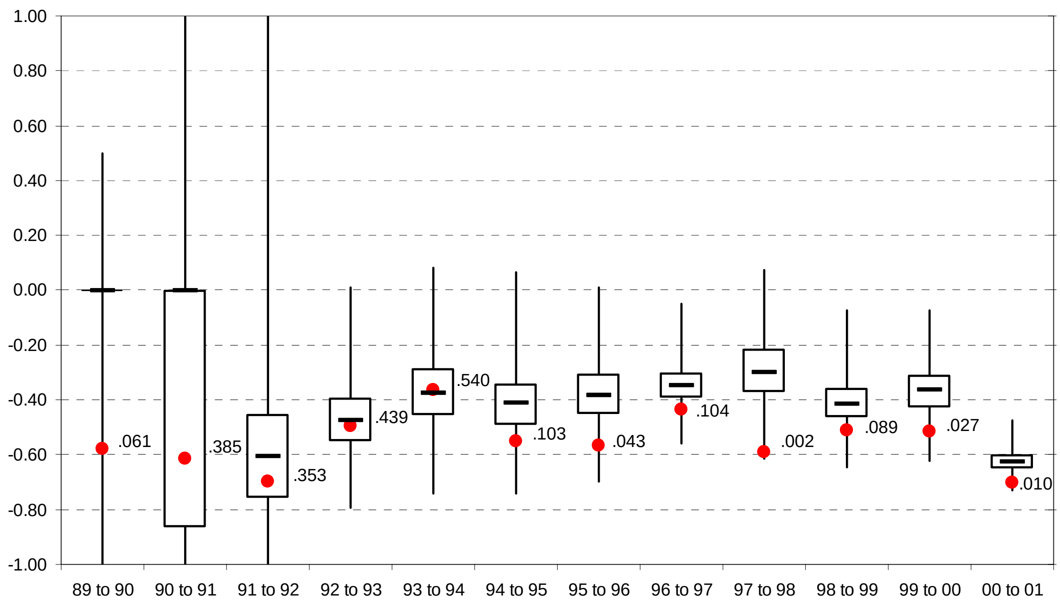
We find a negative correlation between intercohesive ties and group stability. The mean correlation across all years is -0.55, ranging from -0.37 to -0.70. To assess whether intercohesive ties *per se* are a de-stabilizing factor in the life of cohesive groups, we conduct two independent tests.

First, the instability of groups with intercohesive ties might be a function of their differential vulnerability to random perturbations. If we still see a similarly negative correlation when the network is changing purely at random, our findings could be artifacts of our methods for measuring cohesion and stability. If, however, this negative correlation is less likely to occur in a randomly changing network, this would suggest that we are capturing strategic action in group re-formation. We address this question through simulations of network change.

For each pair of years, t and t+1, we record the number of broken ties and the number of new ties. We do so to generate a network at t+1 with the same number of broken ties and the same number of newly created ties as in the observed data. At the global level, the extent of change will be the same; however, the locations where ties are changing (whether broken or added) will be randomly assigned. Call the observed network at t, n_1, the observed network at t+1, n_2, and the randomly generated network at t+1, n_2*. The negative correlations reported above referred to the correlations between group intercohesion in n_1 and group stability from n_1 to n_2. In our simulations we identify groups in n_1, use the same clique percolation method to identify groups in the randomly generated n_2*, and use the same methods to measure stability from n_1 to n_2*. To generate the distribution of expected correlations, we repeat the procedure, computing 1,000 of n_2* for each pair of consecutive years from 1989-90 to 2000-01. Figure 3 shows the results of these simulations together with the observed correlations.

The distributions in Figure 3 show that the expected correlation between intercohesion and group stability is negative under conditions of random network change: the mean correlation across all pairs of years and all simulations is -0.39. Groups with more intercohesive ties are indeed more vulnerable to random attacks on their ties than those with lower levels of intercohesion. But, importantly, Figure 3 also shows that the observed correlations in our data are significantly more negative than the simulated correlations for most years. In the first part of our period, from 1991 to 1994, the observed correlations are close to the simulation results. After 1994, the observed correlations are significantly lower than the simulated ones: observed correlations are more negative than the smallest five percent of simulated correlations. For example, for the network in 1998 the correlation between intercohesion and group stability was so strongly negative that only two simulations out of the thousand exceeded it. Our simulations, therefore, demonstrate that multiple membership ties to other groups contribute to instability beyond the extent we would expect in a randomly changing network.

Figure 3. Simulated and observed correlations between intercohesion and group stability.



Note: Boxplots present simulations results, shaded circles indicate the observed correlation. Numbers next to these dots record the proportion of simulations where the correlation was smaller than the observed.

Predicting group stability

As a second test of the robustness of the negative correlation between intercohesion and group stability we test whether intercohesion has its own predictive power in the context of competing explanations. We use OLS regression models, with group stability as the dependent variable.

Our first independent variable is intercohesion, defined, for a given group in a given year, as the number of groups with which a given group overlaps.

Our second set of independent variables represent intra-cohesive processes. The first variable is *group size*. The second variable registers processes of homophily based on homogeneity in industry profile.[8] We measure this *industry homogeneity* by the numerical difference between the first and second most numerous industry category's share in the group. If the group is entirely of one industry, this variable is equal to one. If there are two equally numerous industries, this variable is equal to zero. Three other variables refer to processes of economic power and dominance in stabilizing or de-stabilizing the group. *Size of the largest firm* is measured in deciles of capitalization, ranging from 1 (smallest firms) to 10 (largest firms). To assess the effects of relative economic dominance we record *size difference* as the size decile-difference between the largest and second largest firms in the group. A larger value indicates a more clearly dominant player in the group in terms of size. *Financial members* records the number of financial firms that are members of a given group.

Our third set of independent variables represent extra-cohesive processes. For each group we record *being brokered* as the proportion of all the other groups to which the group is connected by an intermediary.

Among extra-cohesive processes, we also consider the reach of the group to the political field, notable in a case that involves profound economic dislocation in the context of simultaneous political transformation (Stark and Bruszt 1998). In Hungary a competitive market economy emerges in tandem with the emergence of a system of competing political parties. Hungary's socialist economy was obviously highly politicized, but the politicization of the economy does not end with the creation of a democratic polity. To compete in electoral politics, parties need financing. And to compete in a market economy, firms need timely, insider information about the government's privatization strategies and its policies regulating corporate governance, bankruptcy, trade, and the like. We include three variables to tap various aspects of these processes. *Politicized proportion* records the proportion of group member firms with party affiliations through personnel ties. A group exhibits *political mix* when we find both left and right party affiliations. *Governing party ties* records a group with a political affiliation to a currently governing party.

The final variables in this set of extra-cohesive processes involve links to owners outside the group.[9] *State-owned proportion* records the proportion of group members with the

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[8] Homophily has been shown to be an important factor contributing to cohesive affiliation (McPherson, Smith-Lovin, and Cook, 2001). McPherson and Smith-Lovin (2002:13) define homophily as "the positive relationship between similarity (on almost any dimension) and the probability that two people will have a network connection between them." Although McPherson has not studied business groups, the most pertinent dimension of similarity in this context is homogeneity of industy profile. If homophily is operating among our Hungarian firms, cohesive groups concentrated in the same industry should be more likely to exhibit stablity than those of greater industrial heterogeneity.

[9] Our data set contains detailed information about firms' ownership structure. For each firm we can record whether it has sizeable state ownership and sizeable foreign ownership, as well as

state as a significant owner. *Foreign-owned proportion* similarly records the proportion of group members in foreign ownership.

As control variables we include *year* as well as *group age*, defined as the average number of years that pairs of group members have spent in groups together.

Table 1 presents the results of our regression models predicting group stability. In the first model, not including our intercohesion variable, two variables about economic dominance (size of the largest firm and the presence of financial members) negatively effect group stability. (The negative association between financial members and stability is insignificant once intercohesion is included in the model, suggesting that financial members contribute to instability, because they are at the overlaps of groups.) These findings are in sharp contrast to expectations that powerful economic players hold a group together (Thye, Yoon, and Lawler 2002). Similarly, the finding that size difference does not significantly contribute to group stability does not support the hypothesis that equality of power fosters the maintenance of cohesion (Thye et al 2002). Industry-based homophily and group size are not factors explaining stability.

Among extra-cohesive processes, the number of brokered ties to other groups is significantly correlated with decreased group cohesion, suggesting that brokers adversely impact the structures they exploit. Groups with more members in foreign ownership, on the other hand, are likely to be stabilized. Ties to the state, government, and political parties, whether through ownership or personnel ties, are unrelated to group stability. Among the control variables, we find a positive trend toward greater group stability leading out of the postsocialist period.

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details in the timing of any changes in such ownership. Our definitions of significant state and foreign ownership follow procedures detailed in Stark and Vedres (2006).

Table 1. Linear regression prediction of group stability.

Independent variables	Group stability with all members	
	Model 1	Model 2
Inter-cohesion		-.031***
Intra-cohesive processes		
Group size	-.011	-.005
Size of the largest firm	-.024***	-.019**
Size difference	.001	.000
Financial members	-.056***	.023
Industry homogeneity	-.011	.011
Extra-cohesive processes		
Brokerage	-.011***	-.008***
State owned proportion	-.023	-.002
Foreign owned proportion	.109***	.090**
Politicized proportion	-.040	-.017
Political mix	-.008	-.016
Governing party tie	-.016	.009
Controls		
Year	.023***	.026***
Group age	-.004	-.001
Constant	-1.171***	1.516***
N	525	525
R^2	.372	.432
P-value	.000	.000

*:p<.10; **:p<.05; ***:p<.01.

In Model 2 we see that multiple membership ties of intercohesion decrease group stability. This finding suggests that the presence of multiple insiders stresses the fabric of cohesion. Actors who are ambiguously committed produce destabilizing tensions inside these groups. The interpenetrating ties, through which mutually intercohesive groups adhere, disrupt stability. Intercohesive adhesion erodes and disperses group cohesion.

In a further test we specifically address whether this fracturing occurs only at the points of intersection or is more widespread among the other members in such groups. Are the intercohesive positions (with dense ties inside and outside each of the interconnected groups) somehow weak links? Restated, do intercohesive groups fracture, so to speak, at the hinges, or do the stress forces impact the members who are not themselves in intercohesive positions?

We address these questions in a regression model with a modified dependent variable that records the stability of the subgroup of members that do not occupy the intercohesive position. In this model (see appendix B) we find that the level of intercohesion significantly and negatively effects the stability of that subset of the group as well. In the dynamics of intercohesion, interpenetrating ties do not simply pull the connected groups apart, but contribute to the interior breakup of the groups they interconnected.

Group stability and embeddedness

To this point we have focused on the stability of groups and the interpenetration of groups by shared members. We found that group stability is adversely affected by the multiple membership ties of intercohesion. But should group stability always be valued over instability? Instability might enable flexibility and resource recombination; and stability might lead to lock-ins and isolation.

In this section we zoom out to consider the broader embedding of groups in their network environment. Embeddedness was recently conceptualized as "the degree to which actors' partners (or their partners' partners) are connected to one another through multiple independent paths" (Moody and White 2003, pp. 112). Central to Moody and White's approach is the notion of "node connectivity" which we adopt in our analysis of group embedding. Node connectivity between two nodes in a network refers to the minimal number of nodes (beyond the two in question) that one needs to remove in order to separate the two nodes. If the two nodes are connected by a larger number of independent paths (i.e., they are robustly linked to one another), one needs to remove a larger number of nodes between them to separate the two nodes.

We operationalize embeddedness as the average node connectivity of a group to all other groups. A group might be locally highly connected to one other group, but otherwise located on the periphery of the network. The average node connectivity of this group to all others will not be high. Groups with the highest embedding score will have multiple paths reaching many of the other groups, indicating that they are located in the middle of the network and densely embedded.

Intercohesive ties through multiple members do directly contribute to group embedding. However, in themselves they do not guarantee high embeddedness: A shared member with another group guarantees only a node connectivity of $k=1$ to that group (with the removal of that one shared member, the two groups become disconnected, absent of other ties).

To test how intercohesive ties and group stability affect group embedding, we use an OLS regression model. The dependent variable in this model is group embeddedness; and the independent variables are those of the intra-, extra-, and inter-cohesive processes that we used to predict group stability. Importantly, in this model of embeddedness, we introduce a new variable, *group stability from t-1*, measuring the extent to which a given group maintained its stability from the previous year (or was recomposed out of fragments from other groups in that previous year). In addressing the effects of stability on embedding, we therefore test whether *instability* might positively contribute to greater group embedding.

In Table 2 we see that group stability is negatively correlated with group embedding. Groups that re-formed during the year in question were more likely to have greater node connectivity. Restated conversely, instability predicts embedding. Reshuffling of group membership brings increases robust reach to other groups throughout the network.

Table 2. Linear regression prediction of group embedding.

Independent variables	Group embedding	
	Model 1	Model 2
Inter-cohesion	.042***	
Group stability from t-1	-1.243***	-1.845***
Intra-cohesive processes		
Group size	.043*	.051*
Size of the largest firm	.104***	.152***
Size difference	-.069***	-.063***
Financial members	-.196***	-.102
Industry homogeneity	-.133	-.197**
Extra-cohesive processes		
Brokerage	.031***	
State owned proportion	-.030	.119
Foreign owned proportion	-.444***	-.625***
Politicized proportion	.059	.163
Political mix	.158**	.197**
Governing party tie	-.003	.048
Controls		
Year	.001	.043***
Group age	-.036*	-.047**
Constant	2.134*	-1.460
N	538	538
R^2	.551	.453
P-value	.000	.000

*:p<.10; **:p<.05; ***:p<.01.

Among intra-cohesive processes, not surprisingly, larger group size and a larger dominant firm contribute to greater embedding. Inequality in size distribution within the group negatively correlates with embedding, indicating that groups with more equal size firms will have more diverse ties into the broader network. Unlike large firms, financial firms decrease the likelihood of robust reach, indicating their interest in maintaining a localized group of clients rather than a broadly embedded business group.

Among extra-cohesive processes, being brokered contributes to embedding, as should be expected. Interestingly, political mix, a kind of political brokerage, offers similar benefits in terms of connectivity. Groups that reach both to left *and* right political parties are also more likely to reach out to diverse partners in the business network. Groups with more foreign ownership are disembedded. Although multinationals do form and hold together cohesive groups (as we saw in Table 2), the low node connectivity of these otherwise globalized groups indicates their localized reach. In line with our findings of group stability, the group age variable indicates that groups that have been together for a longer time are less embedded.

To test the robustness of these findings, in Model 2, we exclude variables that involve elements of reachability, thus omitting intercohesion and being brokered. The main finding about instability and embedding remains significant in the modified model.

Intercohesion is destructive: groups where membership is not exclusive suffer a loss of stability. Interpenetrating contact between business groups is destructive even beyond what we would expect by chance – groups seem to break down more often if one or more of their members takes on multiple affiliations. While we have demonstrated that this instability has the function of generating embeddedness, this function is hardly an explanation of why intercohesion occurs even after repeated experiences of disintegrating business groups. The question that we investigate in the following section is whether intercohesion has demonstrable advantages in group performance. Is the destruction of groups by intercohesion a creative one?

GROUP DYNAMICS AND PERFORMANCE

In this section we test whether intercohesive processes, group stability, and group embedding contribute to group performance. Profitability, a widely-used indicator of performance, has questionable validity in the postsocialist setting (ref) where, in an environment of high taxes and changing government regulations, profits can easily be manipulated – euphemistically, "optimized" depending on prevailing regulations. Where operating capital is low, securing revenues was the key to survival. We choose therefore to focus on revenue dynamics, constructing two dependent variables of revenue performance. For each firm, we start by creating an average of real revenue growth from firm level growth data. From this continuous variable we construct two categorical dependent variables capturing the distinctive processes of revenue decline and growth. *Revenue decline* records whether the revenues of the group declined during the year in question. *High revenue growth* records whether the group belonged to the most successful 25 percent of groups in the overall sample (revenues for this top quartile corresponded to at least eight percent annual growth, controlling for inflation).

The independent variables in our models represent intra-cohesive, extra-cohesive, and inter-cohesive processes with the same variables used in the previous models. To the extra-cohesive set, we add group embeddedness. Our performance models include several new control variables: specific *industry* categories, an indicator of whether the group was *newly formed* of firms not belonging to any groups in the previous year, *labor efficiency* (measured as revenues over number of employees), and *capital efficiency* (measured as revenues over capitalization). To correct for skewedness of the distribution on these latter two variables, we take the logarithms.

Table 3. Logistic regression prediction of revenue decline or high growth.

Independent variables	Declining revenue (yes=1)	Top quartile revenue growth (yes=1)
Intercohesion	-.022	.126**
Group stability from t-1	-1.498**	.228
Intra-cohesive processes		
Group size	-.472***	-.106
Capital size of the largest firm	-.134	-.496**
Size difference	.086	-.148
Financial members	.532***	-.516**
Industry homogeneity	.447*	-.909*
Extra-cohesive processes		
Brokerage	-.027*	-.005
State owned proportion	.387	.055
Foreign owned proportion	-.441	-.624
Politicized proportion	1.059	-2.914***
Political mix	-.012	-.561†
Governing party tie	-.145	.371*
Group embeddedness	.143	-.134

Table 3. (*Continued*)

Independent variables	Declining revenue (yes=1)	Top quartile revenue growth (yes=1)
Controls		
Year	-.047	-.017
Group age	.036	.180*
Newly formed group	-.268	-.102
Labor efficiency (log)	-1.006***	1.345***
Capital efficiency (log)	-.265	.468**
Industry		
Energy	-.131	-.627
Mining	.755	1.468
Chemical	.261	.314
Metallurgy	.120	-.798
Heavy industry	.407**	-.048
Light industry	.614***	-.307
Wood and textile	.574*	-.022
Food industry	.385**	.157
Construction	.096	.446*
Wholesale	.629*	-.396
Retail	.302	-.312
Transport	.337	-.536
Services	.409**	.089
Constant	6.639	-5.595
N	430	430
-2LL	518.458	403.743
R^2	.192	.233
% correctly classified	66.4	78.7
$\chi 2$ (*df*)	65.671 (32)	72.542 (32)
P-value	.000	.000

*:p<.10; **:p<.05; ***:p<.01;†: p=.12

In Table 3 we see that stability buffers groups from revenue decline; it does not, however, contribute to top quartile revenue growth. The maintenance of dense cohesive ties within a group enables reciprocity, solidarity, and mutual assistance to act as a kind of safety net, preventing severe market loss in the group. But trust and improved communication within the group are not such assets that stimulate high levels of growth: stability in itself can be a conservatizing closure.

Intercohesion operates as the mirrored opposite of stability: it does not buffer against decline, but it is a strong predictor of high growth. Intercohesive groups exhibit closure without being closed off. These dense ties occur in a group context with mutually interpenetrating ties of cohesion inside other groups. Intercohesive actors indeed might have ambiguous motives from the point of view of the other members of the groups with which they are intertwined. But this friction is a creative, entrepreneurial friction. Not an intermediative process across a gap, this entrepreneurial activity can be recombinative, selectively regrouping resources that yield an advantage not simply to the intercohesive location but to the net benefit of the groups. Recall, by definition, that all the groups that we examine in Table 3 are cohesive. Intercohesive groups outperform their counterparts that lack this ambiguous, yet recombinative advantage.

Recombinative advantage does not confer an ability to optimize on all dimensions. Revisiting our findings on stability in Table 1 in light of our findings in Table 3 on performance, we see that the trade off is clear. Intercohesion contributes to high performance and instability, thus indirectly at the risk of decline.

There is no such trade off for industrial homogeneity and having a financial member. Homophily is a disadvantage. Industry homogeneity increases the probability of decline and decreases the probability of high performance. Groups of more heterogeneous composition are advantaged. This does not apply, however, to groups including members from finance. Groups with financial members are significantly more likely to face declining revenues and less likely to achieve high growth. This result might be surprising to scholars who study business groups; but banking in the postsocialist context was particularly subject to disruption. In the early period banks were strapped with the inherited bad loans of their client firms, later figured in controversial state-funded bank bailouts, and finally were the targets of privatization to foreign banks after 1997. Among other within-group processes, larger group size makes decline less likely without contributing to growth. Having a dominant member of large size makes it more difficult for a group to achieve high growth.

Playing party politics is tricky business. While political contacts do not offer protection against decline, only the most narrow, highly targeted, strategy has payoffs. More politicized groups have little chance of achieving high growth; and mixing left- and right-party affiliations decreases these chances even further. Groups that are overly committed to a party put in jeopardy the trust of their business partners. Groups splitting their political loyalties put in jeopardy the trust of their political partners. Groups can only benefit from party politics when they have a tie to a currently governing party.

Looking at personnel ties reaching to other business groups, we see that effects on performance diminish as distance increases. Groups with more two-step ties to other groups (mediated through brokers), are slightly less likely to decline, but without any advantage in high performance. Robustness of embedding to all other groups neither offers protection against decline nor contributes to higher performance. Groups with ties at the closest reach, not even one step away but through the interpenetrating ties of intercohesion, outperform groups that are exclusive regardless of how intensively or extensively they are embedded.

RECOMBINANT LINEAGES OF COHESION

Intercohesion represents a process of creative destruction. Business groups seem to face a fundamental contradiction, a forced choice to aim either at stability or high performance. To aim at stable performance, groups need stable membership. To stabilize membership, groups need to be exclusive. Overlapping memberships de-stabilize groups, and this higher membership turnover makes losing markets more likely. While exclusivity is attractive by its stabilizing and buffering capacity, this stability makes it less likely that a group will reach high performance. Overlapping groups are more likely to be among the highest performing quartile. This leaves groups with two possibilities: they either stay exclusive and stable, content with modest, although secure performance, or they engage in inter-cohesive linking, possibly outperforming most other groups before they disintegrate.

However, our data indicates a third possibility which renders creative destruction manageable: groups connected by member exchange operate as larger collectivities which absorb and hence limit the scattering of members from de-stabilized groups, thus mitigating the disruptions caused by intercohesion. Instead of becoming dispersed across the whole range of groups in the entire economy, groups break up to rejoin with others near them, regrouping their resources in a fresh, yet familiar, combination. Instability thus becomes member recombination.

Our analyses thus far have worked with data that record changes from one point in time, *t,* to the next, *t*+1. In this section we turn from a dynamic approach to an historical one by following the pattern of member flows across the entire epoch. Whereas in preceding sections the unit of analysis was a group at a given point in time and we estimated stability and effects on performance at the *t* to *t*+1 interval, in this section our unit of analysis is a collectivity of groups linked across time and we follow the entire history of these collectivities through the historical structure of membership flows.

From nuclear groups we now turn to broader kinship structures of business organization. The flows of members trace lineages among cohesive groups. Even though a group might not share any members with another in the past, it can still be connected to it through a chain of ancestry. Our intuition is that groups sharing an ancestry might stay close to one another, connected by inter-cohesive sharing of members and a common, repeatedly interwoven, line of descent. A common ancestry makes group formation easier because routines of collaboration are already familiar. This familiarity facilitates the emergence of intercohesive positions: groups that share an ancestry might be less likely to have radically different routines and cultures of collaboration, thus reducing the coordination costs attendant on the intercohesive position.

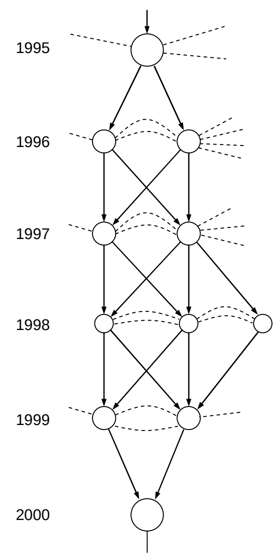
When are two groups related by a link of descent? Returning to Georg Simmel's idea of the persistence of identical selfhood in groups, a group of five members, *a,b,c,d,e*, is strongly related to a subsequent group with *m,b,c,d,e* members. It is also clear that a group with *a,b,c,d,e* is not related to a subsequent group of *f,g,h,i,j*. In between fully related and unrelated there are degrees in strength of a lineage tie. Being faithful to the founding impetus of social network analysis, we believe that the properties of a group are not a summary of the properties of its individual members. Instead, they emerge from the structure of interactions *among* members. This fundamental insight informs our definition of a lineage tie. It is doubtful that two groups can be related – in the sense that there is continuity in how the group operates and the purpose it serves – if they share only one member. Because group qualities stem from interaction along the ties that the group contains, it takes at least two members to establish continuity between their old group and their new group. Continuity in codes of communication and collaboration depend on some continuity in interaction. Therefore, continuity in trust and in routines of reciprocation and resource sharing cannot be transmitted by one member alone. In line with this insight, we define a *lineage tie* between a group at time t and another group at time $t+1$ as the sharing of at least two members.

The idea of lineage ties extends the notion of the persistence of groups. Persistence concerns the length of the lineage: a group that persists over a long period, even if members are replaced along the way, is connected back in time to a long chain of groups. Persistence concerns only one dimension of a lineage – its width. Lineages can also have thickness – involving multiple groups at a given point in time, all connected by a shared ancestry.

We look for structures of lineage ties that are more complex than a simple chain of persistence. Lineage ties link groups at adjacent points in time, as ancestors or descendants. The overall structure of these ties for all the groups, and for all the years that we study, records the history of organizing business groups in our historical analysis. Within this overall structure there might be subsets, *lineage clusters*, with groups that maintain their lineage separation from outsiders and share a distinct set of ancestral groups. In this case, the structure of lineage ties is organized; members leaving a group will have a strong tendency to reform a group with others from the same lineage cluster. Lineage clusters represent separate evolutionary paths of cohesion.

Figure 4 presents an example of a lineage cluster. In 1995 this lineage starts with one group that has three intercohesive ties to groups outside the lineage. In the following year, this group splits into two groups, each of these having two intercohesive ties to one another, as well as having several overlaps with outside groups. Going forward, the two groups are not stable, but they do not dissolve entirely; the lineage is continued. The groups exchange members, while retaining some, so that in 1997, the following year, there are again two groups but of differing composition from the previous year. These groups are interconnected by overlapping membership with two intercohesive ties between them. In 1998, these two groups split into three groups, linked again by shared members but without intercohesive ties to any outside groups. The three groups then merge into two in 1999, and by 2000 these two have merged once again into one group.

Figure 4. An example of a lineage cluster.



Note: Circles represent groups, with size proportional to membership.
Solid arrows represent member flows of at least two firms,
a dashed line indicates an intercohesive group intersection.

The lineage cluster presented in this example displays some peculiar structural properties. Later generations of groups, for example the two groups in 1999, share their ancestry of cohesion all the way back to 1995 (in the postsocialist context, an entire epoch). Moreover, beyond simply sharing the legacy of group routines from 1995, their lines of descent were repeatedly interwoven in such a way that they can, in fact, both trace a lineage to almost all of the preceding groups (with the exception of one group – the outlier third group in 1998).

Figure 5. A typical example from simulated lineages of cohesion.

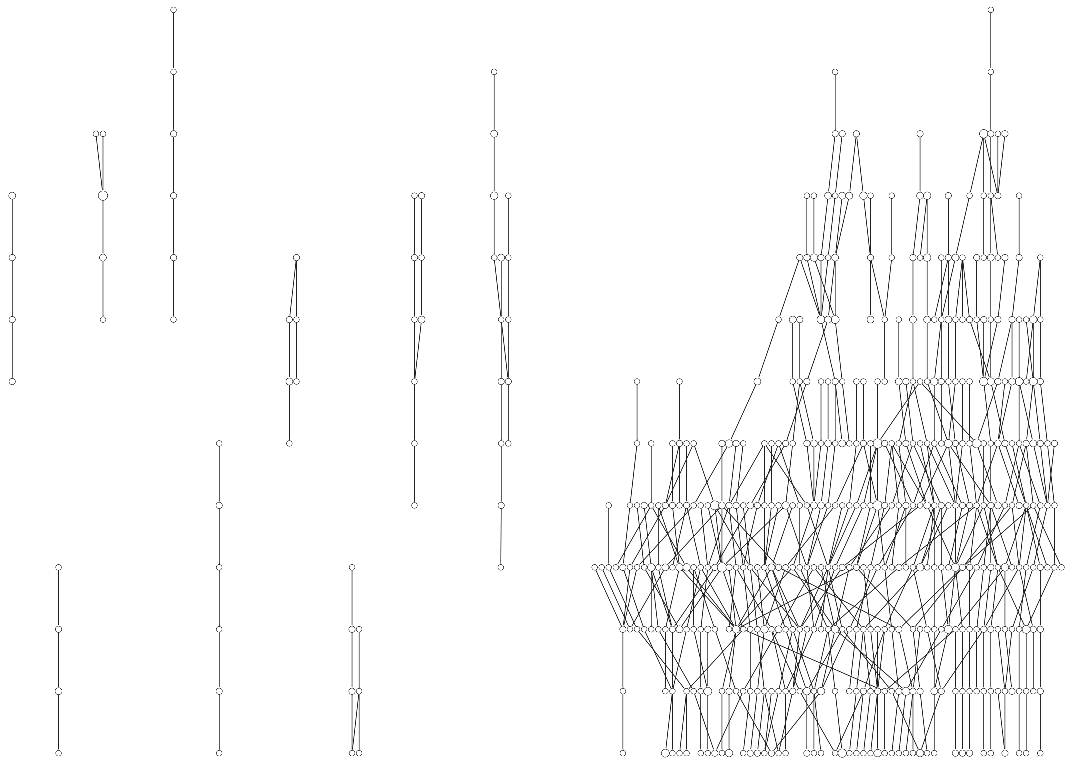
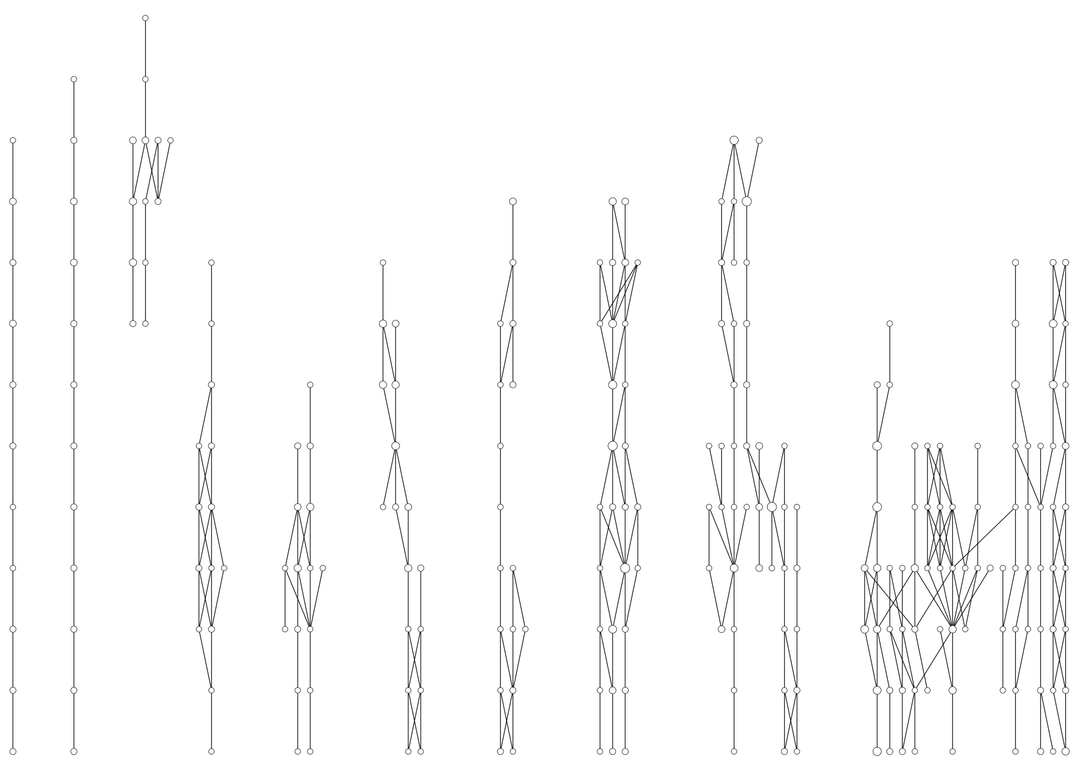


Figure 6. Observed lineages of cohesion.



We argue that the existence of lineage clusters follows from an organizing principle that retains members of de-stabilized groups close to one another. But lineage clusters might also form when lineage ties are created at random, i.e., when a firm in a cohesive group has an equal probability of being a member of any of the groups in the coming year. To test clustering under such random conditions, we compare the observed size distribution of lineage clusters to the size distribution of clusters in simulated lineage datasets. If we find that similarly sized clusters emerge often in random lineage data, we can reject our hypothesis that lineage clusters are a result of business organizing.

We ran simulations to test randomness as an explanation for lineage clusters. In our simulations we fix the degree distribution of incoming and outgoing lineage ties in each year, while randomizing the particular connections. In such a simulated dataset, splitting occurs with the same probability in each year as in the observed dataset in that given year, but members that split apart choose their target groups at random. The same holds for mergers – mergers happen with the same frequency as in the observed dataset, but the particular mergers are randomly generated. Each simulation yields a complete lineage dataset from 1987 to 2001. We generated 1000 such datasets to estimate the distribution of lineage cluster sizes when members migrate to other groups randomly.

Our findings indicate that it is very unlikely that the observed lineage clusters are a result of randomly connected lineage ties. As an illustration, Figure 5 shows the ten largest lineage clusters in a representative simulated dataset (where clustering statistics were closest to the mean of all simulations). Figure 6 shows the ten largest lineage clusters in the observed dataset. The most striking difference between the simulated and the observed lineage clusters is that the largest cluster in the simulated data is much larger than the second largest. Our first measure of cluster size distribution is the relative size of the largest cluster to the second largest. In our observed dataset the largest lineage cluster is about twice as large as the second. In our simulations the largest cluster on average is 32 times the size of the second largest cluster. Only in eight of the one thousand simulations was this ratio smaller than or equal to two. Another measure of clustering is the relative size of the largest lineage component to the size of the complete dataset. In the observed data the largest component encompassed only 14 percent of the total dataset. In the one thousand simulated datasets the largest component on average occupied 69 percent of a given dataset. Only four of the one thousand simulations resulted in a largest component as small as the observed 14 percent. Lineage clusters are not accidents.

We also found that lineage clusters have dense intercohesive ties among the groups they contain. Looking at all the pairs of groups where intercohesion is possible (groups that coexisted in the same year), we found that the density of intercohesive ties is much higher for those pairs of groups that are within the same lineage cluster. The density within lineage clusters is 49 percent, i.e., almost half of the pairs of groups within a lineage cluster are connected by intercohesion. For example, in a lineage cluster with four groups, three of the six possible pairs would be connected – enough to make the lineage cluster a connected component. The density for pairs of groups that do not share a lineage cluster is only three percent. As a comparison, we computed the same density indices for the typical simulated lineage dataset displayed in figure 5. In this dataset the intercohesion density within lineage clusters is only five percent, while the intercohesion density among lineage clusters is only slightly lower, four percent.

In the context of business groups, a focus on lineage clusters highlights that the organizing principle is more complex than bringing firms together into close cohesive contact. The organization of business groups also involves strategic separation – keeping sets of members apart yet, at the same time, maintaining historical coherence. The historical unfolding of organizing business groups leaves its traces as lineage clusters. Lineage clusters highlight an important balancing between two forces. While the friction of intercohesion repeatedly dismantles groups, the shared lineage keeps members within a sphere of exchange in which member resources are redistributed and recombined. Intercohesion prevents groups from freezing into the defensive buffering of exclusivity, while lineage prevents groups from exploding, dissipating the resources they accumulated.[10]

CONCLUSION

Group cohesion in social network analysis is strongly associated with social closure. The process that builds densely linked groups is referred to as triadic closure. In the context of business networks, two strategic partners of a given firm are likely to became strategic partners of each other as well, thus closing a triangle, with three fully connected firms. Closure dominates sociological imagination on small groups because it is in line with a more fundamental assumption that actors prefer to establish unambiguous identities, build homogenous friendship circles, and achieve social balance by being friends with their friends' friends.

If one thinks about closure as social balancing, such inclusion is inevitably coupled with exclusion. Linking to friends' friends has a flipside of keeping away from friends' enemies. Social network analysis is so deeply ingrained with closure as the driving mechanism of cohesion that even the methods developed to identify cohesive groups have exclusivity encoded in them.

But why would forces of harmony be the only drivers of social cohesion? In the business context this is an especially crucial question. Why do business groups exist? Do business groups – arguably some of the largest scale organizational features of the economy – become established to achieve harmony, regain balance, and nurture shared identity? We doubt this is the case. Our research suggests new directions for rethinking concepts of cohesion in the business group context. By offering an alternative topography that combines the structural emphasis of network analysis with an emphasis

10 Our findings are thus in line with research by Uzzi and Spiro (2005) who demonstrate that success in the field of Broadway musicals is explained by a combination of cohesion and connectivity, in other words, of familiarity and diversity. See Wuchty, Jones, and Uzzi (2007) for application and tests of this proposition in a broad variety of settings.

on temporality from historical analysis, we provide a framework to reconsider properties of cohesion and entrepreneurship.

First, we find that cohesion matters for business groups. But, following Simmel, our notion of cohesion here is not a static construct but is understood dynamically as cohesive group stability across time. With attention to topographical features identifying locally cohesive regions within a dynamic context, we find that groups that maintain cohesive stability are more likely to buffer their members from revenue decline. Relations of trust, forms of reciprocity, and improved communication fostered by cohesive stability do not promote high performance, but they do act as a kind of safety net preventing precipitous market loss.

Second, we find that a particular form of cohesion – a structure which we specify as intercohesion – promotes high performance. We interpret this findings as indicating that intercohesion is compatible with entrepreneurial activity. This finding and interpretation go against the grain of current thinking in economic sociology which tends to portray the constraints of cohesion as antithetical to entrepreneurship. A powerful argument in this vein made by Ronald Burt (1992, 2005) is that entrepreneurs do well to avoid spending relational resources on cohesive group membership. Ties within a cohesive group are redundant, channeling the same information from all members of the group and making it impossible for any member to be an obligatory passage point to outside resources. Every tie that leads to more than one member of the same cohesive group decreases entrepreneurial efficiency in this framework.

Burt's concept of structural holes is the most elaborated analysis of the opportunities of brokerage. As the actor who is in between, the broker gains by taxing flows. Our concerns, however, are less with the opportunities for brokerage than in the opportunities for entrepreneurship. Following Schumpeter, we are interested in entrepreneurial opportunities for recombination. Brokers can tax flows, but they cannot mediate what is not flowing – stocks of trust and investments in shared understandings and forms of reciprocity. Whereas brokers tax flows, entrepreneurs redefine resources and recombine assets.

If Burt's notion of the brokerage position is based on a distinctive structural position within a network topography, our notion of the entrepreneurial position is similarly structural and topographical. Following Simmel, we argue that actors can simultaneously be members of more than one cohesive group. With a method that allows us to identify this distinctive position of multiply insider within network topography, we refer to this structural feature as an intercohesive location. Following Simmel to get to Schumpeter, we point to this structural location as the site of entrepreneurial activity proper – the network position where novel combinations of resources are most likely.

To be able to bring about a new combination of resources, an entrepreneur needs to have intimate access to resources – access that can only be achieved by being an insider, an accepted member of a group. To be able to recognize the potential of a new combination, an entrepreneur needs access to diverse sets of resources – access that is only possible by being a member of two or more cohesive groups. Thus, in this framework, instead of being outsiders to multiple groups, entrepreneurs are insiders to multiple groups. Rather than invest minimally in redundant ties, they invest heavily in ties of multiple membership.

We argued and demonstrated that business groups are more an expression of entrepreneurial vision, with all the attendant tensions of resource recombination, than an expression of harmony and flocking together. From this perspective, entrepreneurship, as an enabling capacity, proves productive not so much by encouraging the smooth flow of information or the confirmation of fixed identities than by fostering the generative and productive friction that disrupts the received categories of business as usual and makes possible the redefinition, redeployment, and recombination of resources. Business groups can yield demonstrable returns – if they are nonexclusive. Multiple membership is not a structural anomaly, but a recurring entrepreneurial strategy that combines socially evolved resources from two or more distinct groups.

Third, we find that intercohesive processes disequilibriate; they are disruptive of cohesive group stability. As a result, business groups are dynamic collectivities. Rather than converging to stably balanced membership with shared identity, groups are in constant flux. As combinations of social resources are explored by multiple memberships, the exploitation of these entrepreneurial opportunities leads to group breakup. When viewed through the historical lens of lineage clusters, however, the end of a group is simply a mundane event in chains of reconstituted collectivities comprised of circulating members.

Our fourth major finding, therefore, is that creative disruption becomes viable at the level of lineages of cohesion. In a manner not dissimilar to the intercohesive position – where we find recombination occurring at points of diversity within familiarity – so along the historical dimension, groups form and reform along lines of patterned coherence, separating to encompass greater diversity and rejoining to benefit from familiarity. Whether at the scale of the intercohesive position or along the historical dimension of lineage clusters, the recombinant work of innovation, we demonstrate, requires the dual refrain of familiarity and diversity.

Methodological Appendix A. Choosing the *k* parameter in CPM

The *k* parameter of the CPM method is adjustable. Choosing a lower k results in a more uneven distribution of group sizes. A *k*-value of one is of little utility, since considering the percolation of complete subgraphs of one node means that the whole network is one group. At this extreme value the size distribution of groups is the most extreme – there is just one group that encompasses the whole network. A *k* of two means that we consider the percolation of complete subgraphs of two nodes, that is equivalent to considering the percolation of edges. In this case cohesive groups are the disconnected components of the graph. The size distribution of components is very skewed, as a giant component containing an overwhelming proportion of nodes is a common feature of networks. Increasing the value of *k* to three means considering triangles (complete triads) as the percolating subgraph. Groups in this case are made of triangles sharing at least two nodes. The distribution of group sizes is more even, although in denser networks the largest triangle-percolation cluster can still be much larger than the second in size. Moving to a *k* of four is even more restrictive, since groups need to be dense enough to allow the percolation of complete subgraphs of four. In this case the distribution of group sizes is more even, and there might not be a clearly largest group.

We decided to use a *k*-value of four in identifying clique percolation clusters. Most applications of the CPM method found that there is a percolation transition between a *k*-value of four and three. While a k of four produces groups that are roughly of equal size, a k of three produces a highly skewed group size distribution. Our data confirms this finding, with a k of three the largest group on the average is three times larger than the second largest, while in some years it is five times larger. With a k of four the largest group on average is 1.21 times larger than the second larges, and the maximal size distance 1.57. Thus we decide to use *k*=4 to identify cohesive groups with the CPM method.

Table 4. Group size distribution and node coverage of the CPM method with various *k*-values.

Year	k=2		k=3		k=4		k=5	
	Largest group[a]	Node coverage[b]	Largest group	Node coverage	Largest group	Node coverage	Largest group	Node coverage
1989	18.40	48.76	1.25	20.85	1.00	5.65	-	.00
1990	33.80	45.23	1.20	25.38	1.25	5.53	1.00	.95
1991	53.00	57.02	4.73	32.20	1.50	11.26	1.20	5.57
1992	53.30	61.72	4.85	38.83	1.57	14.93	1.17	7.05
1993	140.60	62.92	1.27	42.98	1.17	15.86	1.17	8.01
1994	106.86	63.13	1.47	45.48	1.13	16.44	1.29	7.26
1995	106.86	61.32	1.41	42.81	1.13	17.48	1.14	6.81
1996	69.18	60.12	5.00	43.38	1.10	21.36	1.17	9.69
1997	130.83	59.56	4.37	40.18	1.10	22.66	1.17	8.47
1998	131.67	58.41	4.33	40.97	1.38	22.08	1.17	7.28
1999	132.17	56.71	3.64	39.35	1.14	18.72	1.14	4.62
2000	109.14	55.11	3.41	37.65	1.14	15.75	1.14	5.60
2001	124.67	54.06	2.11	37.05	1.13	14.89	1.29	5.02
Mean	93.11		3.00		1.21		1.17	
Min.	18.40		1.20		1.00		1.00	
Max.	140.60		5.00		1.57		1.29	

Notes: a. Cells indicate the relative size of the largest group compared to the second largest group.
b. Cells contain percentages of all firms in the dataset in that given year.

Methodological Appendix B. Predictors of group stability without multiple members

Table 5. Linear regression prediction of group stability without multiple members.

Independent variables	Group stability, without multiple members	
	Model 1	Model 2
Inter-cohesion		-.014**
Intra-cohesive processes		
Group size	-.047***	-.056***
Size of the largest firm	-.029***	-.027***
Size difference	.010	.009
Financial members	.060**	.072***
Industry homogeneity	.058	.064*
Extra-cohesive processes		
Brokerage	-.006***	-.005***
State owned proportion	.010	.013
Foreign owned proportion	.051	.046
Politicized proportion	.148*	.129
Political mix	-.004	-.006
Governing party tie	-.047	-.032*
Controls		
Year	.016***	.016***
Group age	.018**	.021***
Constant	-.318	-.293
N	402	402
R^2	.232	.242
P-value	.000	.000

*:p<.10; **:p<.05; ***:p<.01;†: p=.12

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