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The Corporate Elite Community Structure of Global Capitalism

EELKE M. HEEMSKERK & FRANK W. TAKES

A key debate on the merits and consequences of globalisation asks to what extent we have moved to a multipolar global political economy. Here we investigate this issue through the properties and topologies of corporate elite networks and ask: what is the community structure of the global corporate elite? In order to answer this question, we analyse how the largest one million firms in the world are interconnected at the level of corporate governance through interlocking directorates. Community detection through modularity maximisation reveals that regional clusters play a fundamental role in the network architecture of the global political economy. Transatlantic connections remain particularly strong: Europe and North America remain interconnected in a dense network of shared directors. A distinct Asian cluster stands apart as separate and oriented more towards itself. While it develops and gains economic and political power, Asia remains by and large outside the scope of the networks of the incumbent global (that is, North Atlantic) corporate elite. We see this as a sign of the rise of competing corporate elites. But the corporate elites from the traditional core countries still form a powerful opponent for any competing faction in the global corporate elite.

Keywords: globalisation, corporate elites, global order, interlocking directorates, multipolar, regionalism, community detection

1. How is the global economic order structured?

The extent to which the global economic order has moved from a unipolar to a multipolar configuration is one of the key debates today, in international relations and increasingly in political economy as well. At least throughout the twentieth century the global political economic system can be best described as unipolar, with the centre of power concentrated in the industrialised West and with the USA as the hegemonic power. In this unipolar world it was theoretically sensible and empirically valid to distinguish a hierarchical structure between the core

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countries near the hegemon, a semi-periphery and a periphery (Wallerstein 1974). But there is growing evidence of recent and far-reaching transformations in the global economy. The perceived success of a number of developing countries has led to the 'rise of the South' or a 'East–South turn', where the supremacy of the West is eroded and a next generation of world-leading economies gains increasing global power (Nederveen Pieterse 2011, Saad-Filho 2014). This literature is particularly interested in the rise of China (Breslin 2011, McNally 2012) and in the growing importance of the BRICS countries (Brazil, Russia, India, China and South Africa, Wilson *et al*. 2003, Becker 2013). The observation that the financial and economic crisis that has swept the world since 2008 originated in the (former) hegemon, the USA, further illustrates the demise of a unipolar world. (Although some trace the antecedents of the great crisis back to China (see for instance Mees 2012)). These transformations in the global power balance are seen as signs of an emerging multipolar global order, wherein there would no longer be a clear hegemonic core but rather a set of competing power blocks. Globalisation would lead to multipolarity, wherein the countries representing the majority of the world population would have come to the global head table (Nederveen Pieterse 2011: 27). Some see this as the coming of age of a 'truly' global order, while realists point at the inherent security risks the rise to power of, for instance, China poses to the existing order (Deng 2006, Mearsheimer 2010).

An opposing perspective contests this reading of recent events. Here, Anglo-American-dominated liberal capitalism and its financial markets in the West remain in the lead. Globalisation causes emerging markets to 'join the club' but does not fundamentally alter the global order; the core countries remain dominant (Ikenberry 2008). Instead of multipolarity, the global order is best described as a plutocracy (Nederveen Pieterse 2011). In this plutocracy, power rests with a transnational elite or capitalist class that shares a distinct outlook, ideology and globalising perspective (Van der Pijl and Yurchenko 2014: 16). Globalisation does not lead to competing elites but to the rise of a transnational elite, one that increasingly includes members from outside the traditional core countries but still adheres to its neo-liberal persuasions (Sklair 2001, Robinson 2012, see Carroll 2013 for a nuanced reading of the literature).

This on-going opposition on the character of the global economic order remains unresolved, in part because both perspectives focus on different (empirical) fragments of recent transformations, be it a preconception with particular regional cases (multipolarity) or a bias towards Western industrialised elites (plutocracy). We suggest a novel approach to shed light on this issue. First, we look at the overall picture and take a network perspective. The debate is about the structure of the global order, and we can picture the world as one large network that is organised according to historic power relations of trade, colonisation, war, culture, language and religion (Castells 2011). A network perspective allows us to investigate the properties of the structure of the global economic order. Second, we take the corporation as the main object of study, and in particular the ties that embed corporate control in a social network of corporate elites. We argue that a network analysis of the entire global network of managerial corporate

control is an expedient empirical strategy to study the properties of the global economic order.

Globalisation is a container for a huge variety of processes and developments. But nobody disagrees that it at least deals with the internationalisation of economies and business. Yet, much of the socio-economic and political science literature and data gathering still work under the premise that states are the most important actors in the global political economy. The bias towards the nation state persists despite growing evidence that such bias is patently misplaced; we have known for a long time that states are not the most important actors. Many new forms of private transnational regulation have emerged, wherein corporations, think tanks and international organisations work with and alongside states to set standards and build necessary institutions to support global capitalism (Bartley 2007, Vogel 2010). Networks of private global governance have emerged to fill the void between national state hierarchies and global markets (Pattberg 2005).

Corporations not only play a dominant role in these networks; they are also increasingly interdependent. Although often depicted as atomistic and individualistic market actors, corporations are tightly embedded in networks of corporate control (Uzzi 1997), ownership (Vitali *et al*. 2011, Compston 2013), trade (Abdollahian and Yang 2014) and global production (Henderson *et al*. 2002). These corporate networks are appealing objects of study if we want to understand how globalisation affects the global order. They allow us to move beyond aggregated statistics on a national level and investigate how key actors in globalisation are embedded in more or less transnational networks. Can the traditional core countries maintain their power position in the transnational network of corporate control vis-à-vis emerging regions? Is there still a hierarchical core-periphery structure that now integrates the hitherto more distant parts of the global economy into the networks dominated by the West, as expected by the global plutocracy perspective? Or do we see distinct, cohesive substructures that suggest we live in a multipolar world? The main question we aim to answer is therefore: what is the community structure of the global network of the corporate elite?

The few empirical studies that tried to understand the network structure of the corporate global order cover particular industries (for the oil business see De Graaff 2012a, 2012b), particular regions (for Europe, Heemskerk 2013, Heemskerk 2011) or contested policy issues (for instance Perry 2009 on global policy networks on accounting standards). Dasandi (2014) studies the network of international trade, but is mainly interested in how a countries network position affects poverty and does not consider the overall network structure. And most studies on transnational corporate elite networks leave us mainly with 'anecdotal evidence and theoretically informed speculation' (Burris and Staples 2012: 324). Fortunately, recent innovations in methods and data offer ways to overcome this burden and fill gaps in our knowledge; new data sets are emerging with standardised information on millions of events, and we are discovering the methods and the computational means to analyse these huge amounts of data.

In what follows, we analyse how the largest one million firms in the world are interconnected in 2013 at the level of corporate governance through interlocking directorates. We use a community detection algorithm to reveal that regional clusters play a fundamental role in the network architecture. The global economic

order rests on three main pillars: North America, Europe and Asia. Transatlantic connections remain particularly strong: Europe and North America remain interconnected in a dense network of shared directors. The Asian cluster stands apart as separate and oriented more towards itself. While Asia develops and gains economic and political power, it remains by and large outside the scope of the networks of the incumbent global (that is, North Atlantic) corporate elite. South America and Africa, on the other hand, remain rather sparsely connected. The West's traditional position of power is being infringed on by the rise of regional business communities, and the Asian community is structurally well positioned to form a new power base in the global political economy. The outcomes underscore that our research strategy looking at corporate control and using big data helps to better understand key questions in the political economic literature.

We proceed as follows. The next section starts with a concise review of previous studies on the network structure of global corporate elites and a discussion of the theoretical interpretation of board interlocks. After that, we introduce the specific methods that we employ here as well as the data set on the global network of interlocking directorates among the largest one million firms. The empirical section then reports on the properties of the global network of interlocking directorates and on the results of the community detection approach. This approach uncovers eight communities, which are discussed in more detail. In the concluding section we reflect on our empirical and theoretical findings, as well as on the research strategy we employed.

2.   Global networks of the corporate elite

According to Burris and Staples, one of the most provocative theses in the field of economic globalisation 'is that, as transnational corporations become increasingly global in their operations, the elites who own and control those corporations will also cease to be organised or divided along national lines' (Burris and Staples 2012: 324). Interlocking directorates are important building blocks for corporate elite networks and business communities. We follow Mizruchi's definition of an interlocking directorate as the instance when 'a person affiliated with one organisation sits on the board of directors of another organisation' (Mizruchi 1996: 271). Board interlocks simultaneously create direct links between the top decision-making bodies of corporate governance *and* tie together the corporate elite in a social network of mutual interests, responsibilities and corporate control. Board interlocks are therefore at the same time an indicator of corporate control and of elite cohesion. A large body of literature has established that interlocking directorates have been the cornerstones of national business communities all over the globe ever since large corporations emerged (Stokman *et al*. 1985, Kogut 2012). Social structures such as the network of interlocking directorates – in concert with policy-planning networks, conferences, forums and so on – help to build consensus and conformity and give direction for change (Domhoff 1970, Heemskerk 2007, Carroll and Sapinski 2010, Richardson *et al*. 2011).

Signs of the increasingly international economic activities of corporations in the 1970s immediately led to an intense debate on the rise of a transnational capitalist class. The few contemporary empirical studies indeed demonstrated that to a

certain extent a transnational corporate elite had emerged (see for instance Fennema 1982, Fennema and Schijf 1985). In the wake of the crisis of corporate liberalism and as internationalisation proceeded 'corporations exchanged the reliance on their respective states for cooperation with other corporations, horizontally' (Van der Pijl and Yurchenko 2014: 11, italics removed, see also Mizruchi 2013 for an elaborate example of the corporate elite in the USA). However, this transnational network was first and foremost the cement of transatlantic economic relations and interests and an infrastructure for an Atlantic ruling class (Van der Pijl 1984). It integrated the corporate elite of North American and European big business. Asia remained disconnected. Here, board interlocks were mainly used as a tool to integrate corporations from distinct business groups (Fennema 1982, Granovetter 2005).

The transnational network of interlocking directorates remained remarkably stable until the end of the twentieth century (Carroll and Fennema 2002). Only since the turn of the century, transnational board interlocks have been on the rise (Carroll 2004a, Kentor and Jang 2004b, Carroll *et al.* 2010). This increase in transnational interlocking is remarkable given the consistent and on-going decline of board interlocks in national business communities. A closer look reveals that this increase is mainly due to the growing levels of interlocking boards of directors within Europe (Carroll *et al.* 2010). One decade into the twenty-first century, a pan-European corporate elite network emerged that connects the boardrooms of the largest European firms (Heemskerk 2013, Heemskerk *et al.* 2013).

Board interlocks bring together the control over corporations in the hands of a ruling elite. As such they are an indication of elite cohesion. A large literature has also established that interlocks function as conduits through which routines and practices spread from board to board (Davis 1991, Haunschild 1993, Stearns and Mizruchi 1993, Geletkanycz and Hambrick 1997, Gulati and Westphal 1999, Rao and Sivakumar 1999). Building on this evidence, we see the network of board interlocks as an opportunity structure for the reproduction of existing beliefs and ideas, as well as for the dissemination of new ones. Thus, the power of the corporate elite does not necessarily operate through direct intervention in the discretionary decision-making of corporate boards, but rather through this elite's 'ability to set the parameters of the corporate environment within which all large enterprises must act' (Scott 1991: 188).

The structure of corporate elite networks is relevant to the extent it is consequential for the behaviour of the actors that are embedded in the network. Social structures and actions are intrinsically connected:

> [A]ctors do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy. Their attempts at purposive action are instead embedded in concrete, on-going systems of social action. (Granovetter 1985: 487)

This perspective calls for a nuanced view in the structure – agency debate that steers clear of either an under-socialised or over-socialised view. Network

structure may not determine future decisions but it does shape their outcomes. In that we follow Van Apeldoorn and De Graaff (2014, 33) and consider agents (in this case corporate directors) to be operating within social structures that form the (unacknowledged) conditions of their actions. How structure conditions agency is mediated by the ideas and beliefs that the agents hold. Ideas cannot be reduced to the social position an agent occupies, yet neither can they be understood as existing independently of that position, that is, from the social structure in which any ideational practice is embedded (Van Apeldoorn 2002: 19).

Following this line of reasoning, the level of integration of the global corporate elite can be determined by looking at the extent to which the global elite network is fragmented into distinct cohesive subgroups or communities. Communities are groups of actors that are more strongly connected among themselves than with the other actors in the network. Within a community, a certain belief system or corporate regime can be persistent. Cohesive communities in a network of interlocking directorates hint at pockets within the corporate elite that are oriented towards each other's interests and ideas. The extent to which the global corporate elite network falls apart in distinct communities is therefore an indication of how cohesive the elite is. If the global economic order is multipolar, we expect distinct communities that hint at different sets of ideologies and interest. If, on the other hand, the global order is best characterised as a plutocracy, we expect to see a cohesive community that integrates elites from across the globe.

3. A big data social network analysis

3.1. *Social network analysis*

We use network analysis to study the properties of the set of interlocking directorates worldwide. Social network analysis has a long and fruitful history in the social sciences, and its methods and theories figure prominently in the debates on globalisation. And recently the fields of computer science, mathematics, physics and complexity studies have shown increasing interest in complex network analysis as well, leading to a great number of breakthroughs (Borgatti *et al.* 2009, Schweitzer *et al.* 2009a, 2009b). Bringing these strands of research together, we are now able to combine advanced analytical and computational tools and big data with the persisting question on the architecture of the global order.

The network of interlocking directorates is an affiliation network (see Wasserman and Faust 1994 for an authoritative overview of social network concepts and methods). The building blocks of the network are firms, persons, and the affiliations between them. The affiliations are the ties in the network. For the purpose of our study, we are interested in how firms are connected through shared directors. We therefore derive the firm-by-firm projection of the original affiliation network. In this network all nodes are firms. There is an edge between two nodes if the firms share at least one officer or director. The degree of a node gives the number of edges, that is, the number of other firms it shares with an officer. If two firms share an officer, they are directly connected; their distance in the network is one. Two firms that both share an officer with a third firm are

connected in the network by a path of two edges, meaning they are at distance two. In general, two firms (nodes) are at distance d if they are connected via d interlocks (edges) between firms.

Early studies on interlocking directorates were mainly interested in simple network properties such as degree or the density of a network (the edges as share of all possible edges). While degree remains a useful indicator of the local centrality of firms, it is much more difficult to determine a useful interpretation of a measure such as network density. This is particularly the case for the international network of interlocking directorates, where there is no other empirical reference point to compare it to. The metrics that are used remained relatively simple, such as the ratio between intra-national and international ties (see for a discussion Burris and Staples 2012). An important breakthrough in the study of complex networks with direct relevance for our work came with the introduction of what has become known as small world statistics (Watts 1999, Kogut and Walker 2001, Uzzi *et al.* 2007, Kogut 2012). The key insight here is that real-life networks do not resemble random networks but are in fact highly clustered. However, despite the high level of local clustering the average distance between nodes is often surprisingly low. This is what happens when you meet a stranger who knows a friend of a good friend and you say: 'hey, it's a small world' (in network terminology: you are connected at distance two). Small world properties are typical for almost all social networks, but also electricity grids, the Internet, neural networks and scientific citation and collaboration networks exhibit similar small world properties (Newman 2001). The crucial insight from this literature is that social networks are typically clustered in dense subsets, where nodes are tightly connected with one another through strong ties. Weak ties connect these subsets with other subsets. Granovetter (1973) famously coined the 'strength of weak ties' when he recognised that through weak ties you can access new information and other parts of the network. And Burt (1992) subsequently developed the theory of how brokers benefit from spanning structural holes in a network.

3.2. *Community detection*

The realization that networks are structured as interconnected dense subsets makes it important to understand where these subsets reside in the network. These subsets are communities following a structural definition as a group of nodes that share more connections with each other than with others outside their group. Here we introduce a relatively new technique into the study of corporate networks that make it possible to investigate the nature of the community structure of large networks (Newman and Girvan 2004, Heemskerk *et al.* 2013, Vitali and Battiston 2013): the modularity maximisation technique (Blondel *et al.* 2008).

Modularity is a measure that indicates the quality of a division of the entire network into non-overlapping clusters or communities. This approach has been applied to a range of application domains such as brain networks (Meunier *et al.* 2009), social networks and information networks (Leskovec *et al.* 2010). It bases its value on the fraction of the edges that fall within the discovered

communities, after deducting the expected number of such edges in case the edges of the network were randomly chosen. For a given network, a higher modularity value means that there are more connections between nodes in the same cluster than between nodes in different communities. Community detection algorithms use the modularity value to assess the quality of a given division of the network into communities, and generally attempt to maximize this value. A resolution parameter then lets the user determine how 'tough' the algorithm should be in looking for communities, essentially balancing the number of discovered communities and the ratio of inter- and extra-community links. This means that lowering the resolution parameter leads to a slightly lower modularity value, but a division into a larger number of communities. In practice, the resolution feature allows us to analyse the community structure by starting with the entire network and gradually 'peel off' cohesive subgroups that are more connected with each other than with the rest. At each 'level' of this peeling process, we discover additional communities, usually as the result of a division of a community from the previous iteration into two or more new communities. This is the approach that we use in the empirical results section below.

In a similar study on a smaller set of Italian firms, Piccardi *et al*. (2010) find that the Louvain community detection method (Blondel *et al*. 2008) outperforms both the spectral method proposed by Newman (2006) and the greedy algorithm based on extreme optimisation (Duch and Arenas 2005). We apply the implementation of the Louvain algorithm as included in the open-source graph visualisation and manipulation software Gephi. The problem of maximising modularity is computationally very hard, and the corresponding decision problem has been shown to be NP-complete (Brandes *et al*. 2008). To solve this, approximation algorithms are used, which means that some fuzziness is involved in the final results. Substantively, this means that the outcomes must be closely assessed and interpreted. In what follows we explicitly take up the task of assessing the usefulness of these methods for social scientific studies such as ours.

3.3. *Data*

For this study we take the largest one million firms across the globe as the universe of big business. We sourced our data from the ORBIS database of Bureau van Dijk. This big data approach is an answer to on-going problems with data collection and selection. The first problem lies in the laborious nature of data collection, in particular for those studies interested in transnational corporate networks. In order to test the hypothesis that managers of big business organise themselves in networks of interlocking directorates, one first has to determine a certain selection of firms that aptly covers 'big business', collect information on all of their directors and manually check for overlap in board composition. The inconsistent spelling of names in annual reports makes this a tedious task (even more so when the Internet was not yet available). Sampling strategies are therefore a balancing act between resource investment and feasibility. As a consequence, most of the studies on corporate elites have a strong bias towards the largest firms. With limited resources available it makes sense to make sure the biggest among big businesses is included in the sample, but this may very well lead to a distortion

of the findings. For one, existing studies have a strong bias towards the Western world. By and large, the East and the South are left out. As a consequence, most studies have a relatively limited scope and offer only piecemeal glances at elite networks. The second problem concerns sampling strategies. One key issue concerns the merits of a stratified sampling technique along regions vis-à-vis sampling based only on firm size, for instance according to market capitalisation (Carroll and Fennema 2004, Kentor and Jang 2004a). Different sampling strategies lead to different outcomes, although the differences are arguably within the margin of the same general results (Both approaches, for instance, find that the increase in transnational interlocking directorates in the closing decades of the twentieth century predominantly takes place within Europe, with the remaining ties occurring by and large between European and North American firms (see also Burris and Staples 2012: 325)). However, the ideal approach is not to sample at all but rather to study the entire population of big business. Recent advances in data availability now make it possible to make first steps with such an approach.

Our source, ORBIS, contains information on over 100 million public and private companies worldwide, sourced from over 100 information providers. The quality of the data is reasonable, but not without flaws. For individual firms, data on board composition might be incomplete or partially false. The error rate is likely to be larger for the smaller firms whose information is not regularly updated. In addition, for some countries it is easier to source good business information than for others. One of the major downsides of using big data is that it becomes unfeasible to manually check the quality of the data. In terms of corporate board and top management overlap there is the additional issue of distinguishing between what we call social ties and administrative ties. Social ties are those board interlocks where directors interact with other senior management in at least two corporate settings. However, there are also board interlocks that result from what we may call administrative ties. These ties emerge, for instance, from complex 'mailbox company' structures. Here, firms only exist on paper for administrative, financial and often fiscal reasons (shell companies). Professionals such as lawyers often have 'board seats' on such firms, but this does not indicate actual meetings. In addition, board interlocks may result from the pyramidal structures of holding companies and corporate groups (Barca and Becht 2001). It proves extremely difficult to filter out the administrative ties without reducing the quality of the remaining network data (see supplementary material for a more detailed discussion). This means that we need to take into account that administrative ties may influence our results. In general, we acknowledge that the data are not necessarily complete and without errors. But given this caveat, we see the ORBIS database as the best available big data source and for this reason it is the source for similar studies as well (Vitali *et al*. 2011, see also discussions in Compston 2013).

In selecting the organisations, we proceeded as follows. We collected our sample of firms in July 2013. We selected all firms active in business in the category 'very large & large companies' for which there was information on board or top management team composition. The result is a set of 968,409 distinct firms from 208 different countries. Figure 1 shows the distribution of firms over

FIGURE 1. The largest one million firms in the world

the globe. The number of firms per country differs greatly, from about 15,000 for China and the USA to one each for Myanmar and Turkmenistan. This makes sense, as some countries are larger and economically more developed than others (see Figure 1, and supplementary material for more information).

We include all personal interlocks at both the senior management and board level, particularly because of the diversity in classifications of board and top management positions across the globe. Because we are interested in the social network connecting corporate boards, we include only persons; firms that are registered as board members are disregarded.

3.4. *Network descriptives*

In total, our network contains 3,262,413 individuals. Out of this group of corporate executives and board members, 366,871 (11.15 per cent) have positions with at least two firms. They are the inner circle that creates the global network of interlocking directorates. A sophisticated name and attribute matching algorithm implemented in the ORBIS database identifies the cases where one person serves at more than one firm. Within the set of about one million firms, many remain isolated in the sense that they do not share directors with another firm. The interlocking directors create connections between the leaderships of 391,992 distinct firms. The network contains 1,712,060 edges or interlocking directorates between firms, some of which are created by more than one person. Table 1 provides a set of descriptive statistics for the network.

TABLE 1. Characteristics of the global network of interlocking directorates

Firms	968,409
Directors	3,262,413
Average directors per firm	3.37
Directors with >1 affiliation	366,871
Per cent of directors with >1 affiliation	11.25%
Average number of interlockers per firm	0.38
Average number of interlockers per active firm	0.94
Per cent of firms active in graph	40.5%
Nodes (companies)	391,992
Edges (interlocks)	1,712,060
Edges per firm	4.37
Clustering coefficient	0.530046
Average distance	7.88
Connected components (Ccs) with size >1	55,620
Firms in largest Cc	238,866
Per cent of firms in largest Cc	61%
Edges in largest Cc	1,533,080
Per cent of edges in largest Cc	89.55%
Clustering coefficient in largest Cc	0.620937
Average distance in largest Cc	7.75

4. Empirical results

4.1. *The global network of interlocking directorates*

Big business has strong interconnections across the globe – not only through trade relations and global product chains, but also through shared corporate directors. On average, firms share directors with 4.37 other firms. And 60 per cent of all firms with interlocking directors are members of one large connected component, where almost 90 per cent of all board interlocks take place. This means that the boards of these firms are connected at the highest level of corporate decision-making. The average distance between firms in this component is 7.75 interlocks. Some are even better connected, such as Deutsche Bank, which is on average connected to all other corporate boards by 6.36 interlocks. It is a small world indeed. This means that if Deutsche Bank's board meets every month, a rumour or innovation that starts in January may spread to the majority of the global corporate elite by September. A highly contagious virus could similarly wipe out most of the global corporate elite within a year (see Davis *et al*. 2003). The lion's share of this board interlocking still takes place between firms based in the same country. But already about 20 per cent of all interlocks cross borders and contribute to international networks. Figure 2 illustrates how the corporate elite connects the different parts of the globe in a network of corporate control.

4.2. *Nested communities in the global corporate elite*

We now turn to the issue of how the global network of interlocking directorates splits into distinct communities. In order to investigate this, we first merge firms by country of location, merging all firms within any particular country into a single node. Note that this removes all ties between firms in the same country; only the transnational interlocks remain. The result is a network of countries where the weight of the edges signals the number of pairs of firms that share at least one board member between those countries. On this network we apply the community detection approach as explained above. Figure 3 shows how the global network gradually breaks apart into eight distinct communities. The communities are colour-coded. Below the figure, we include the resolution parameter and the corresponding modularity value (averaged over 10 runs). Where a community appears in the sequence of iterations is an important consideration. The first communities to emerge are the ones that are most distinct from the rest of the global network. Communities where the firms have a relative lot of board interlocks with firms in other communities as well show up in later iterations (because they are less distinct). Because the sequence matters, we first discuss the emergence of the communities and then turn to a more detailed look at the eight final communities.

Already at the first iteration (Figure 3(a)), the algorithm splits an Asian community off from the rest of the network. This means that this set of Asian countries is strongly connected among themselves through interlocking directorates. The corporate elite in this set of countries is the most distinguishable group in the entire global elite. A closer look shows that the cluster includes China, Hong Kong, Singapore and Malaysia, but not Korea and Japan. Bermuda and the Cayman Islands
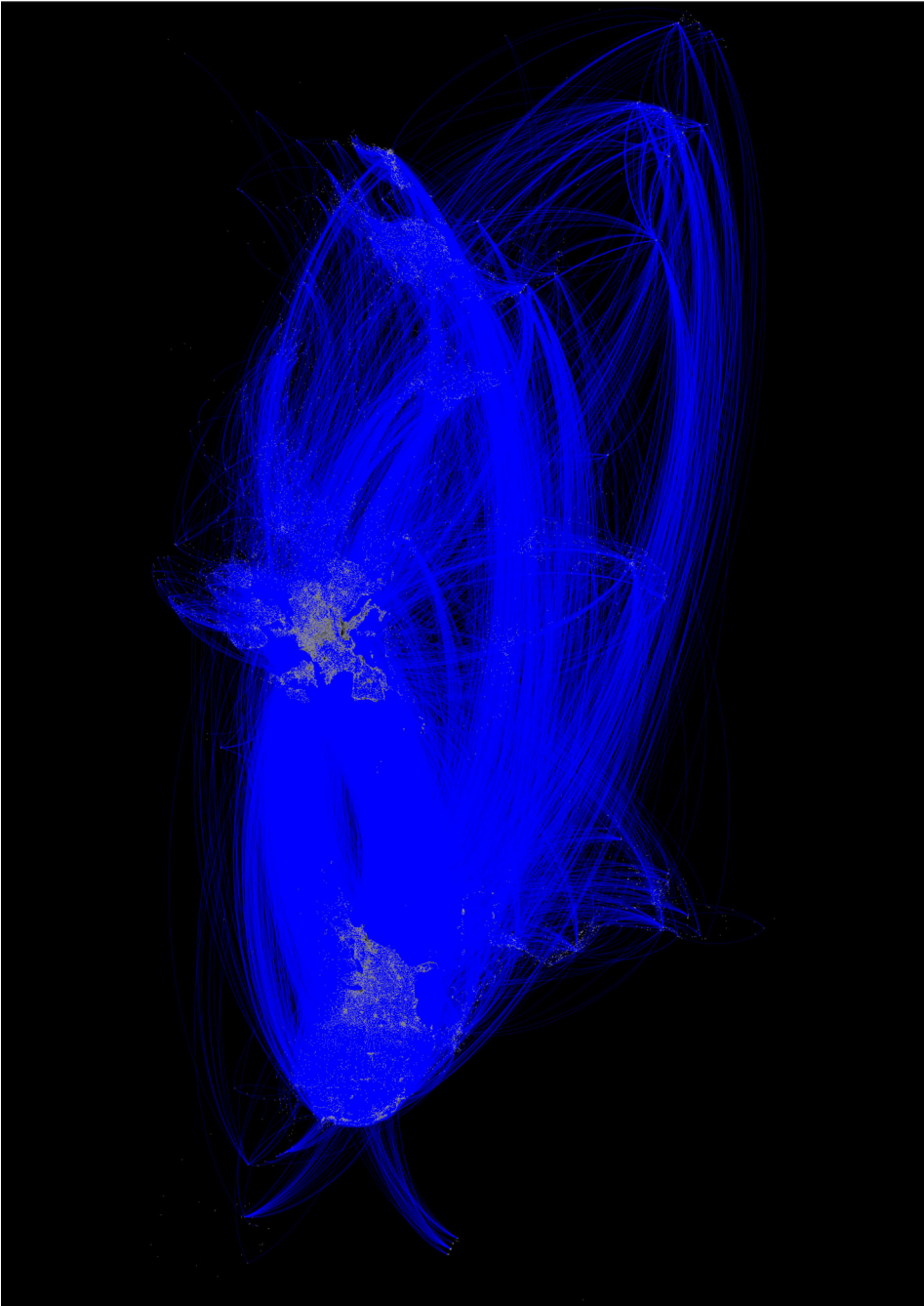
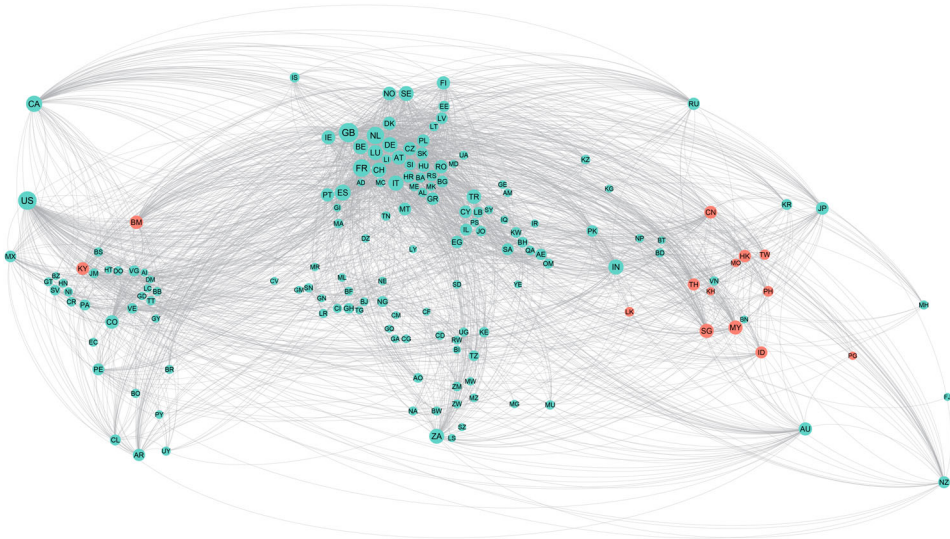FIGURE 2. The global network of interlocking directorates

FIGURE 3. (a) Global network of interlocking directorates, two communities.
Note: Resolution: 2; Averaged Modularity value over 10 runs: 0.983.

are also in this community; a set of administrative ties with Asian real estate firms is the cause of this. Unlike some other communities that will emerge at further iterations, the Asian cluster remains stable and coherent when the number of communities increases. This points to a coherent business community network in this part
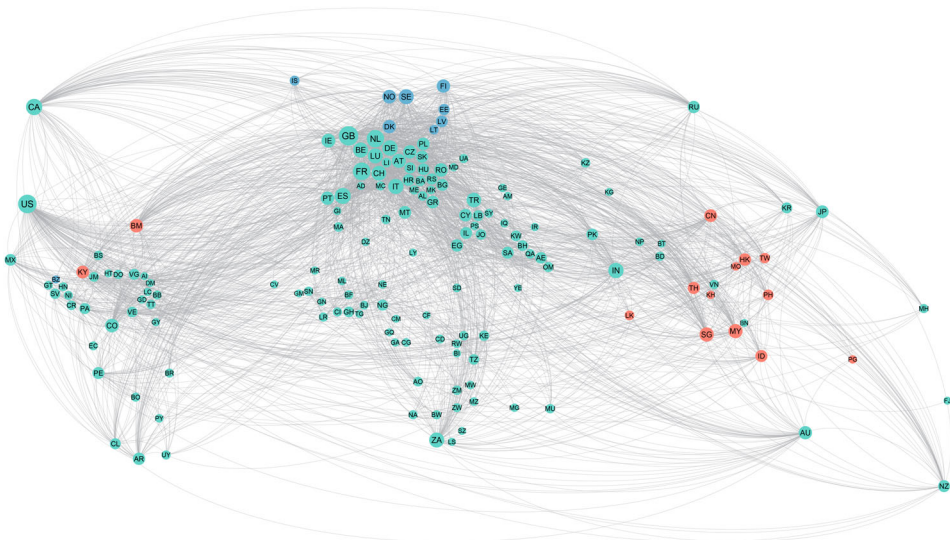

FIGURE 3. (b) Global network of interlocking directorates, three communities.
Note: Resolution: 1.75; Averaged Modularity value over 10 runs: 0.797.
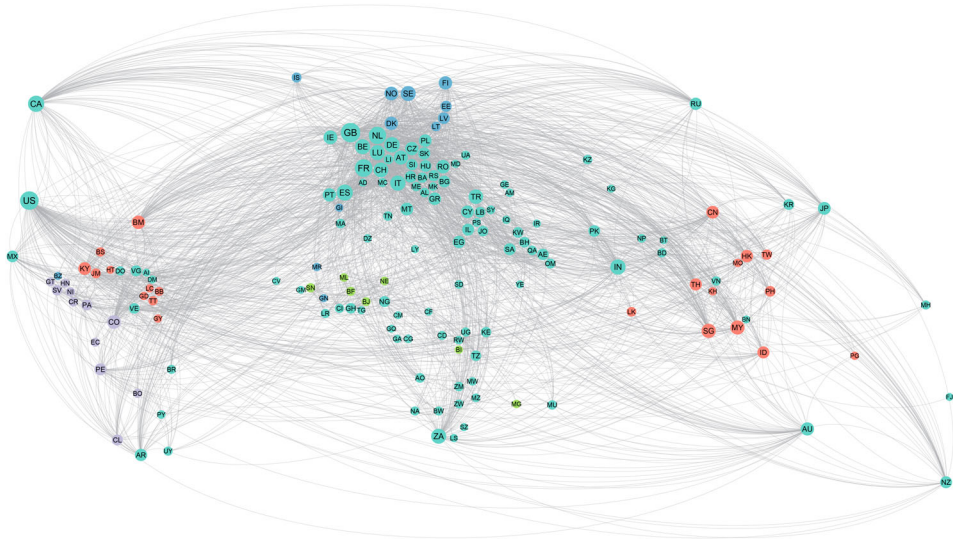
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FIGURE 3. (c) Global network of interlocking directorates, five communities.
Note: Resolution: 1.5; Averaged Modularity value over 10 runs: 0.591.

of Asia. The Asian corporate elite has a strong regional orientation and is distinct from the global corporate elite.

At the next iteration (Figure 3(b)), we see that a community of the Nordic and Baltic countries emerges. Like the Asian community, the Nordic/Baltic community proves very stable. Further dissection of the network first adds an unstable African community (not shown) and subsequently reveals a Latin American community (Figure 3(c)). Interestingly, the south-eastern countries in South America are still part of the 'rest of the world' community, signalling that the western part is the most cohesive area in South America. Also, Mexico remains part of the 'rest' and is not part of the Latin American cluster.

A dissection into six communities (Figure 3(d)) gives a more fine-grained view of the underlying structure of the global corporate elite. The Latin American cluster now includes almost the entire region. Mexico is now also part of the Latin American cluster. What is happening is that when the 'rest of the world' community separates into several communities, the ties of, for instance, Mexico with the Latin American cluster become relatively more important. Interestingly, Brazil is the only Latin American country that is part of the large 'western' cluster. This western cluster brings together the USA, most of Western Europe, the UK and Commonwealth countries, as well as some African countries. It also includes Turkey and Israel, as well as Japan and Korea. Distinct from the western cluster is an Eastern European community of former socialist countries and Russia. At the level of the business elite, the iron curtain is still discernible.

Further dissection of the network reveals something remarkable. Notwithstanding the increasing level of pan-European interlocking directorates over the past two decades, the underlying community structure of the European
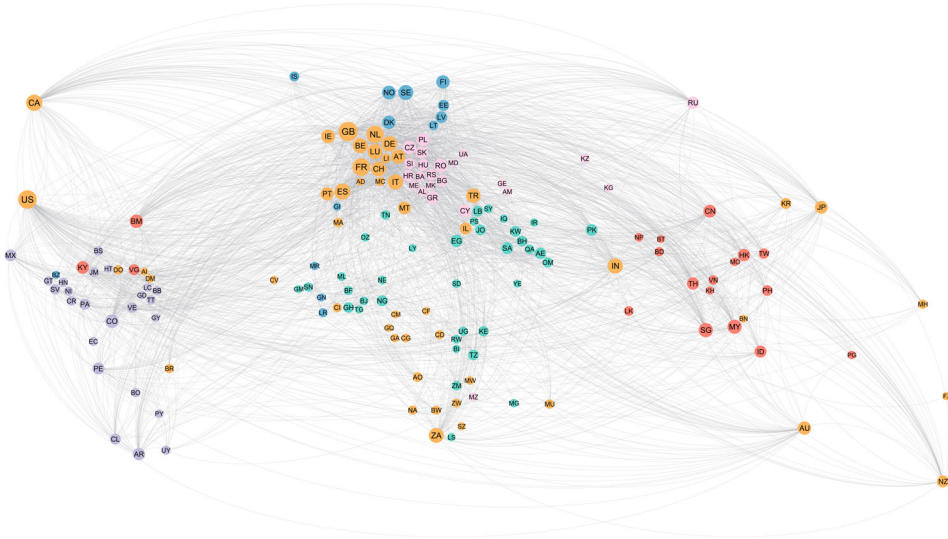
FIGURE 3. (d) Global network of interlocking directorates, six communities.
Note: Resolution: 1.0; Averaged Modularity value over 10 runs: 0.221.

corporate elite shows strong fragmentation. At seven communities, a new German community emerges, integrating much of nearby Eastern Europe, but not Poland. Finally, at eight communities (Figure 3(e)) the western cluster is reduced to an Anglo-American core (North America, UK, Commonwealth countries) and the Netherlands. Germany and France have their own communities, and a separate Mediterranean cluster has emerged. All this suggests
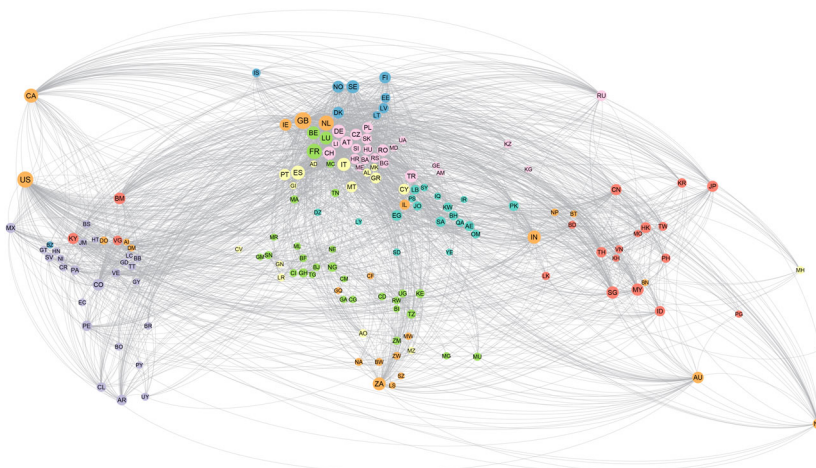

FIGURE 3. (e) Global network of interlocking directorates, eight communities.
Note: Resolution: 1.0; Averaged Modularity value over ten runs: 0.082.

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that Europe remains divided along geographical lines, even when we only consider border-crossing ties. Table 2 shows how countries are distributed among the eight clusters, as well as the relative centrality of the countries' positions in the entire network. Further iterations of community detection are possible. We choose to stop at these eight clusters, because they provide enough detail for the purpose of our analysis.

4.3. *The limits of community detection algorithms: the case of Belize*

The Nordic and Baltic community illustrates the limits of the community detection approach we use here. Surprisingly, we see that Belize is consistently put in this community. This is even more surprising because the one firm from Belize with transnational connections is a cash shell, connected to a British corporate group. Two directors of this cash shell serve on five other British firms, one Hong Kong-based firm and only one Swedish firm. Yet the community detection algorithm puts Belize in the Nordic community, and not in the British one. This is because Belize does not really belong to any community. The algorithm therefore tries to group Belize with a community with a small number of countries that are strongly connected, as adding Belize to such a group has little impact on the modularity score of that cluster. The Nordic and Baltic countries are indeed strongly interconnected and relatively few in number. The western cluster that contains the UK, on the other hand, is much larger. Adding Belize to that cluster would more negatively impact its modularity score. Thus, the position of Belize in the Nordic community has no substantive meaning. It is a country at the fringe, without a clear position in the structure of communities. This example underscores the importance of closely studying the results of the community detection approach before making conclusions. It also reminds us that although methods from the complex network analysis toolbox have their strengths, they cannot be applied in the social sciences without care and close scrutiny.

4.4. *The eight communities in global capitalism*

Let us now take a closer look at the eight communities. Table 3 shows how the countries, firms and interlocks in the network are distributed over the eight communities. The first to emerge, the Asian community, is the most distinct part of the network. The community is built around Singapore, Malaysia, Hong Kong and China. In the last iteration, when the western cluster further splits, Japan and Korea are added as members of the Asian community as well. The peripheral position of Japan and Korea in this cluster is also evident in the sociogram of relations between community members, as shown in Figure 4. If we disregard the ties with Bermuda and the Cayman Islands, the most dominant relations are those between Singapore and Malaysia on the one hand and between China and Hong Kong on the other. Notably China does not occupy a particularly powerful or strategic network position. In terms of size this community is quite large. It contains 11.6 per cent of all countries and over 30 per cent of all firms.

The second discernible cluster is the Nordic and Baltic one. The Nordic countries Sweden, Norway, Denmark and Finland share many corporate directors.

TABLE 2. Country membership of global corporate elite communities

North Atlantic & Commonwealth Community
GB United Kingdom (100); US United States (95.2); NL Netherlands (78.7); CA Canada (71.9); ZA South Africa (62.8); IN India (61.8); IE Ireland (46.7); AU Australia (43.1); NZ New Zealand (34.8); IL Israel (33.0); NA Namibia (16.6); DO Dominican Republic (15.1); BW Botswana (13.8); MW Malawi (13.4); ZW Zimbabwe (13.3); NP Nepal (13.2); LS Lesotho (7.7); SZ Swaziland (5.3); CF Central African Republic (5.2); GQ Equatorial Guinea (5.0); BT Bhutan (4.8); BN Brunei Darussalam (4.3); DM Dominica (4.3); AI Anguilla (4.3) and FJ Fiji (4.2)

Latin American Community
CO Colombia (44.7); AR Argentina (35.0); PE Peru (33.1); MX Mexico (31.4); PA Panama (27.3); CL Chile (26.9); VE Venezuela (23.8); SV El Salvador (23.3); JM Jamaica (19.9); TT Trinidad and Tobago (17.2); CR Costa Rica (16.4); BS Bahamas (15.1); BB Barbados (14.8); UY Uruguay (13.1); NI Nicaragua (13.0); BR Brazil (12.8); BO Bolivia (12.8); EC Ecuador (12.0); HN Honduras (11.8); GT Guatemala (11.1); PY Paraguay (9.0); GD Grenada (8.3); LC Saint Lucia (8.0); GY Guyana (6.8) and HT Haiti (5.8)

Asian Community
SG Singapore (49.4); MY Malaysia (49.4); BM Bermuda (44.6); CN China (38.7); JP Japan (38.4); KY Cayman Islands (38.3); HK Hong Kong (35.7); ID Indonesia (34.0); TH Thailand (33.4); KR Korea (25.5); VG Virgin Islands (25.0); PH Philippines (24.1); TW Taiwan (21.1); LK Sri Lanka (17.5); VN Viet Nam (14.1); BD Bangladesh (14.1); MO Macao (8.1); PG Papua New Guinea (7.6) and KH Cambodia (6.8)

Nordic & Baltic Community
SE Sweden (56.3); NO Norway (45.7); FI Finland (42.2); DK Denmark (41.4); LV Latvia (30.2); EE Estonia (26.0); IS Iceland (17.6); LT Lithuania (15.8) and BZ Belize (4.9)

Eastern European community
DE Germany (58.3); CH Switzerland (54.2); TR Turkey (52.2); AT Austria (46.8); RO Romania (43.1); CZ Czech Republic (41.7); PL Poland (36.0); RU Russian Federation (34.2); SK Slovakia (32.7); BG Bulgaria (31.3); HR Croatia (30.4); HU Hungary (30.4); SI Slovenia (26.8); RS Serbia (25.6); BA Bosnia and Herzegovina (21.5); KZ Kazakhstan (16.5); LI Liechtenstein (15.1); ME Montenegro (13.2); UA Ukraine (12.7); GE Georgia (10.5); AM Armenia (8.2); MD Moldovo (6.6) and KG Kyrgyzstan (5.6)

French Community
FR France (84.7); BE Belgium (57.7); LU Luxembourg (56.1); NG Nigeria (33.5); TZ Tanzania (27.7); GH Ghana (27.6); KE Kenya (26.1); UG Uganda (19.9); ZM Zambia (18.0); SN Senegal (17.9); MA Morocco (17.3); BF Burkina Faso (16.6); TN Tunisia (16.1); CI Cote d'Ivoire (15.9); MU Mauritius (15.7); CD Congo (14.1); BJ Benin (13.9); MC Monaco (11.9); RW Rwanda (11.4); ML Mali (11.3); CG Congo Brazzaville (11.0); NE Niger (10.8); MG Madagascar (9.8); GA Gabon (7.8); BI Burundi (7.0); MR Mauritania (7.0); TG Togo (6.3); GM Gambia (4.4) and CM Cameroon (4.3)

Middle Eastern Community
EG Egypt (39.1); SA Saudi Arabia (35.5); PK Pakistan (31.4); AE United Arab Emirates (30.4); LB Lebanon (26.6); BH Bahrain (25.5); JO Jordan (25.4); KW Kuwait (24.9); OM Oman (20.6); QA Qatar (15.8); SY Syrian Arab Republic (10.8); SD Sudan (10.0); DZ Algeria (8.4); PS Palestine (8.3); IQ Iraq (8.0); IR Iran (7.0); LY Libyan Arab Jamahiriya (5.8) and YE Yemen (5.0)

Mediterranean community
ES Spain (64.4); IT Italy (58.6); PT Portugal (44.7); MT Malta (39.4); C Y Cyprus (38.4); GR Greece (36.5); AO Angola (17.7); AL Albania (15.5); LR Liberia (13.8); MH Marshall Islands (13.8); MZ Mozambique (10.5); MK Macedonia (8.8); GI Gibraltar (6.2); GN Guinea (5.7); AD Andorra (4.9) and CV Cape Verde (4.2)

Note: For each country the centrality score in the entire networks is included. The number reflects the relative pagerank score. The United Kingdom is most central and sets the baseline (=100). For example, the USA pagerank centrality is 95.2 per cent compared to the UK, and so on.

TABLE 3. Properties of the eight communities

Community	% Share of countries	% Share of all firms	% Share of intra-community edges	Average number of interlocks within the community, per firm
Asian	11.59	30.39	12.61	0.65
Nordic & Baltic	5.49	4.87	10.98	3.54
Latin American	15.24	2.48	1.26	0.80
Middle Eastern	10.98	0.63	0.51	1.27
Eastern European	14.02	17.99	9.23	0.81
North Atlantic & Commonwealth	15.34	29.36	49.70	2.66
French	17.68	6.11	6.00	1.54
European Mediterranean	9.76	8.17	9.71	1.87

Estonia and Latvia are well connected to this Nordic clique, as well as Lithuania to a somewhat lesser degree. Corporate governance in the Nordic countries is embedded in a cohesive network of boards and directors. Indeed, the Nordic and Baltic cluster is the densest of all communities: firms share, on average,
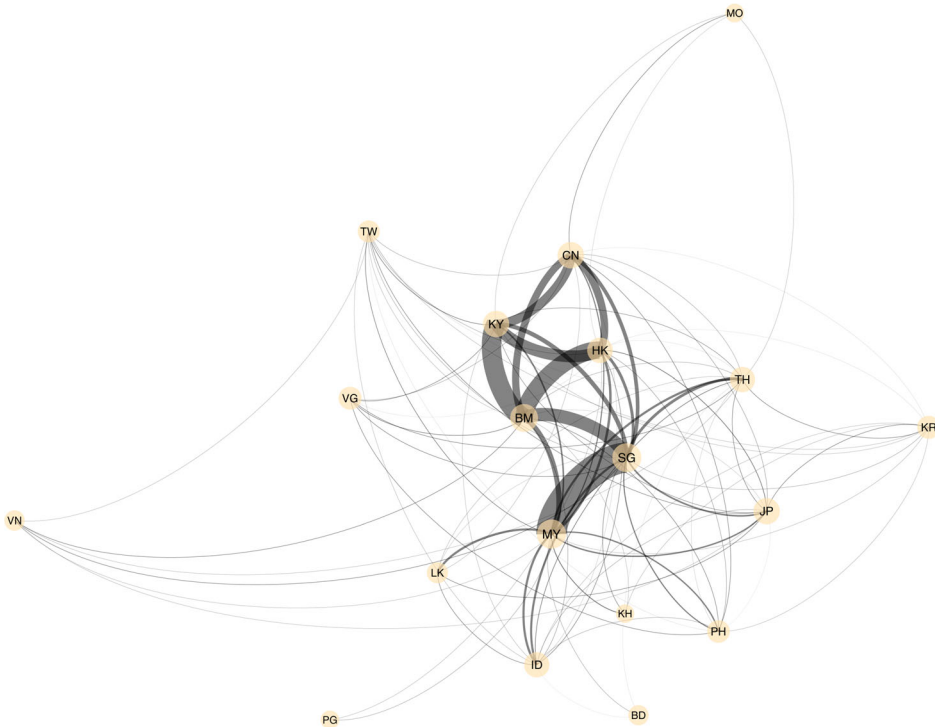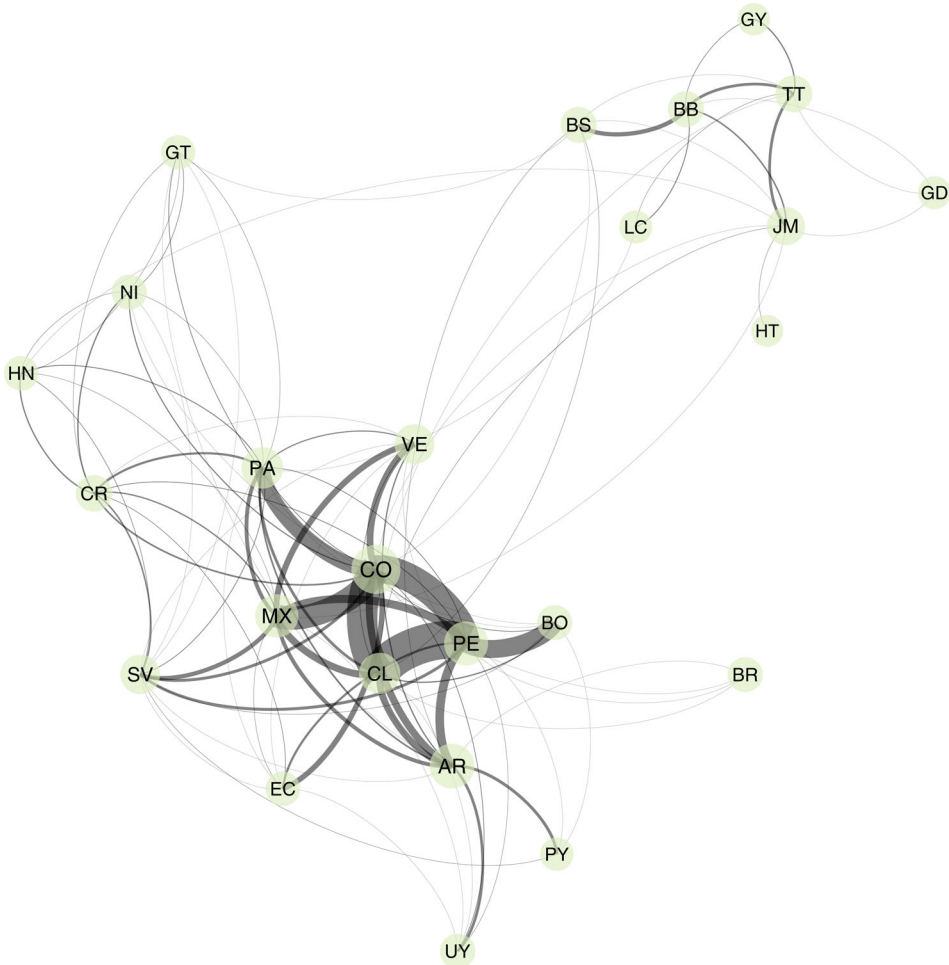

FIGURE 4. The Asian community

FIGURE 5. The Latin American Community

directors with 3.54 other firms in this community. In sharp contrast, in the Asian community firms are only connected to 0.65 firms on average.

The Latin American community has as its backbone the strong ties between Peru, Colombia and Chile, as illustrated by Figure 5. Evident in the sociogram is the distinct Caribbean cluster. If we continued dissecting the network into more communities, the Caribbean would again emerge as a distinct community. This community shows relatively low levels of cohesion compared to the other communities (see Table 3). Of special interest is the position of Brazil. Although in the end Brazil ends up as a member of the Latin American cluster, it only separates from the western community in the last iteration. This implies that at the level of corporate governance, the corporate elite in Brazil is much more oriented towards the West than any other Latin American country. Brazil is not a central

actor in the Latin American network of the corporate elites, but rather a bridge between Latin America and the West.

Fourth, the community analysis finds a distinct Middle Eastern cluster of interlocking directorates. Corporate elite studies have hitherto ignored the Middle East as a site for empirical research. Yet not only do we find a significant set of board interlocks connecting the boardrooms of the Middle East, but the region also forms a distinct community of directorates. And while it only accounts for half a per cent of all intra-community edges (due to the small number of firms in this community), the firms do have more than one board interlock with other Middle Eastern firms on average.

Fifth, Eastern Europe shows itself to be a distinct community, with Germany in an interesting position. Although Germany is quite central in the Eastern European community, it is also well connected to other communities in the entire network. Because of this broker role, Germany is only added to the Eastern European cluster at the last iteration. The strongest ties occur between countries that are part of the European Union. At the same time Russia is also part of this cluster. As with Brazil, it remains peripheral to the network.

The sixth community contains the transatlantic core countries and brings together North America with the UK and Commonwealth countries such as South Africa, India and Australia. The Netherlands is also part of this community, reflecting the strong political and economic transatlantic orientation of the Netherlands. If we look at the share of interlocks that take place within communities, the western cluster accounts for almost half. Not only does this community contain a large share of the total firms (about 30 per cent), but also these firms frequently use board interlocks to create elite networks of corporate governance. The transatlantic axis in business interests has been studied extensively, and our findings show that the relevance of this organising pillar of the global corporate elite has not waned. The fact that it only shows up after a number of iterations means that this community is well connected to other parts of the global elite as well.

The final two communities flag the fragmented foundation of the European corporate elite. France has its own community, mainly oriented towards its former colonies. And a distinct European–Mediterranean cluster connects Spain with Italy and Greece, as well as Portugal and its former colonies Angola and Mozambique.

Some firms in these eight communities also reach out and share board members with firms in other communities. Figure 6 shows the network between communities. The ties between the clusters represent board interlocks between firms in these communities. The value on the edges is the percentage of all inter-community interlocking directorates that together form that particular connection. For instance, the interlocking directorates between firms from the Middle Eastern and Eastern & Central European (upper left side of Figure 6) account for only 0.12 per cent of all corporate board interlocks between communities, while the edge connecting the French and the North Atlantic & Commonwealth clusters contains 18.84 per cent of all inter-community interlocks. This is consistent with the fact that the French community only separates itself at later stages in the community detection process. The North Atlantic & Commonwealth cluster
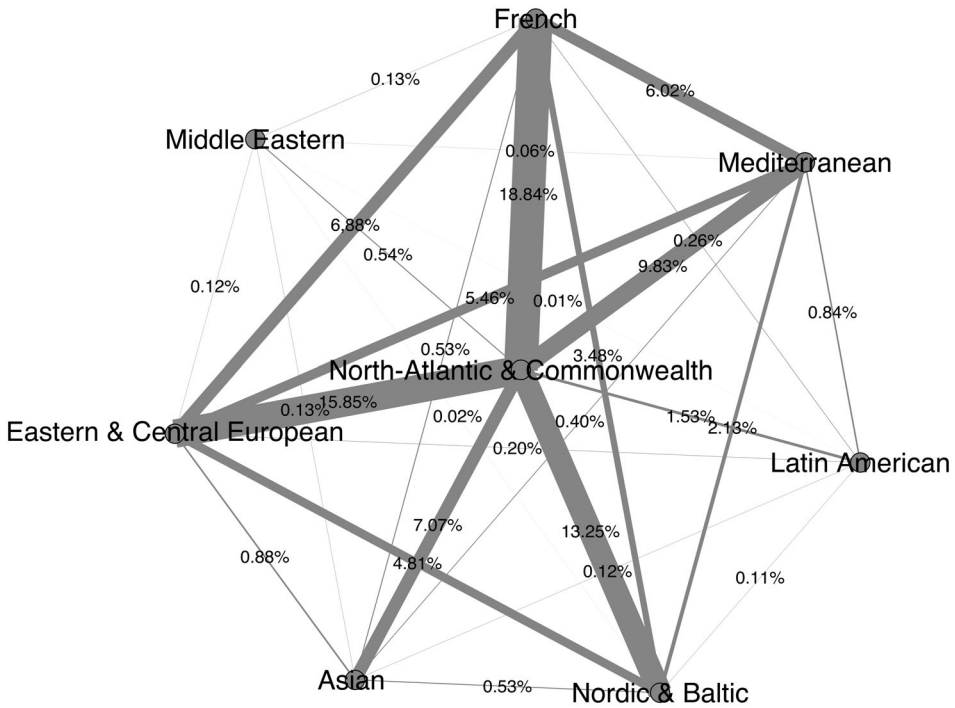
FIGURE 6. The community network of global capitalism

dominates the network. It remains particularly strongly connected to the four European communities. The transnational network of interlocking directorates has a strong base in Europe. At the same time, the Asian cluster hardly connects to the other communities, except for the North Atlantic & Commonwealth one. Thus, the overall community structure still shows the centrality of the transatlantic connections, or the structural power position of what Van der Pijl has coined the North Atlantic ruling class (Van der Pijl 1984). Yet at the same time there are no signs that this North Atlantic ruling class has been successful in integrating or co-opting the ascendant Asian corporate elite into its midst.

5. Conclusions and discussion

5.1. *Towards a multipolar global order?*

We see evidence of both multipolarity in the global corporate elite network and indications of enduring stability in the dominance of the traditional and incumbent transatlantic core elite. At the core of the network structure, we find a cohesive transatlantic community bringing together North America, the UK and Common-wealth countries as well as the Netherlands. The transatlantic corporate elite remains at the backbone of the transnational corporate network. At the same time, there is a distinct Asian cluster as well. South America on the other hand

has rather sparse connections. Africa remains the outlier. Here the transnational corporate elite's relationships still follow the historic connections of colonisation. The overall picture shows that the world order, as depicted by the global social network of the corporate elite, rests on three main pillars: North America, Europe and Asia. The triad structure of the global order is still visible today (Ohmae 1993, Ruigrok and Van Tulder 1995). At the same time, a set of relations between Asia and the North Atlantic alliance shows a break with the past, when Asian countries were disconnected from the transnational network (Fennema 1982, Carroll and Fennema 2002). We also found that the important emerging markets such as Brazil, Russia and China are not central to 'their' communities. Perhaps this is because their large internal markets make them less dependent on other countries and regions in the world. Or perhaps they strategically position themselves as bridges in the global corporate network, as seems to be the case for Brazil.

The West's traditional position of power is being infringed on by the rise of regional business communities. The fact that the Asian community is the most distinct part of the global network implies that it is structurally well positioned to form a new power base in the global political economy, competing with the incumbent Western-centred liberal order. A separate Asian business community may facilitate the emergence of a distinct Asian- or perhaps Sino-variety capitalism, as the social networks among the corporate boardrooms form an opportunity structure for particular belief systems and corporate regimes. And the more self-oriented and insulated the Asian corporate elite is, the higher the chance that a distinct corporate regime will emerge or survive. Yet the traditional core countries, in particular the UK and USA, remain at the centre of the transnational corporate network. Even if the organisation of the corporate elite through interlocking directorates is only a small indication of the business elite's cohesion, our results clearly signal that the corporate elites from the core countries form a powerful opponent for any competing faction in the global corporate elite.

5.2. *A multi-level structure in the transnational corporate elite*

Our results corroborate earlier findings that most transnational board interlocking occurs in Europe. This has been interpreted as a part of development towards institutional completion of European Unification (Carroll *et al.* 2010). A cohesive business community thus remains part and parcel of the way economy and society are institutionalised. However, underlying the overall increase that other studies have uncovered in network density among the top decision-making bodies of Europe's largest corporations, we find a remarkably fragmented corporate elite community structure. The dividing lines that set apart the European corporate elite in distinct communities have a clear *regional* orientation. Carroll and Fennema concluded that by 1996 the transnational corporate elite network was best described as a superstructure that rested upon rather resilient national bases (Carroll and Fennema 2002). Our results rather suggest a *multi-level structure* where, in between the national and the transnational, discernible regional clusters play a fundamental role in the network architecture. This finding is in line with the

observation that in the international commodity trade network, intra-regional density is greater than inter-regional density. On the basis of their longitudinal study, Kim and Shin (2002) even argue that the structure of world trade has become decentralised over time. Our findings show that regionalism is also evident in the structure of the network of the global corporate elite.

There are a number of mechanisms that may drive the regional patterns that we find. First of all, geographical distance is likely to play an important role as the investment that directors have to make for their board membership increases with the distance that lies between the boardrooms. Transnational board interlocks span on average 3022 kilometres, but the distance is not normally distributed. Board interlocks that span more than 1000 kilometres are relatively rare, indicating that space does play a role in corporate elite networks (see also Carroll 2004b, Heemskerk 2013: 87–89,). In the supplementary material, we give additional information about the geographical distance that the board interlocks cover. Second, business cultures do still differ significantly across the different regions of the world. Previous research found a link between the topology of networks of interlocking directorates and the variety of capitalism dominant in a country (Van Veen and Marsman 2008). Different preferences of corporate (and political) elites regarding the coordination of markets may lead to different regional patterns in board interlocks. A third and related mechanism that we need to mention is that of language. We may expect that corporate boards that work with the same language are more likely to share board members. Some of the eight communities seem to overlap with a language group, such as the Latin American (Spanish), the Middle Eastern community (Arabic), the Commonwealth (English) and the French (French) community. At the same time, the language effect is not obvious in the Nordic, Eastern European and even Asian community. And while language barriers may be one part of the explanation that, for instance, Brazil is not well connected to the Latin American community, it is not true that Brazil links with Portuguese-speaking countries. In fact, it is not only strongly connected with the USA but also with France (much more than with Portugal). And in the French community the similarity in language reflects path-dependent interdependencies between the countries that go back to times of colonisation. In sum, space, time, culture and language certainly all play a role in the formation of the global network of interlocking directorates, but the details of how this plays out cannot be answered here.

5.3. *Suggestions for further research*

This brings us to the questions our work raises. Our results show that interlocking directorates are a common practice and form distinct communities in all parts of the world, including the Middle East and Latin America. And it shows that we can use new, large databases to uncover the network structure connecting corporations and their ruling elites. This study is in many ways a first step. It provides a baseline against which we can assess future developments and dynamics. These future studies are likely more detailed and sophisticated. Perhaps most promising is that we can move to an analysis where we do not a priori assume that countries matter, but first generate community structures from the full firm-by-firm

network and then see how this overlaps with nation states and other political-geographic boundaries. Another pressing question that our big data approach triggers concerns the added value of information of millions of firms and directors. Future research can use similar data to test what proportion of the entire network we need to have to establish robust estimations of the underlying topology.

Concerning our methods, we made a crucial caveat concerning the modularity maximisation algorithm we used: the results must be accompanied by close interpretation to adjust for some fuzziness in the outcomes. We expect that in the near future we will see increasing use of (network) science methods in the social science, and we believe that this is fruitful progress. But as social scientists we need to closely scrutinise the new methodological toolbox and discuss this in our publications.

It is safe to assume that the practice of interlocking directorates has a different function in Western Europe than in Asia (see for instance Kogut 2012). An important issue for further research is therefore to uncover how the function of interlocks differs across the different regions in the world. The realisation that the global corporate elite operates in distinct regional communities means that we may have to take into account the regional specificities of the corporate environment to understand how power accrues to corporate actors and interests. For instance, what is the role of board interlocks in a corporate environment where the state is dominant, as in many of the emerging markets? Some suggest that here hybrid elites emerge that connect the spheres of influence of business and of the state (De Graaff 2012a). But how do these hybrid elites position themselves against the incumbent transnational corporate elites?

These questions call for a multi-method approach, where network analysis methods are complemented by in-depth, qualitative studies. In other words, we need to 'thicken' research on the global corporate elite. This includes a better understanding of the career trajectories and recruitment patterns of elites (Bühlmann *et al*. 2012, Dudouet *et al*. 2013), their connections with politics and the state (Heemskerk *et al*. 2012, Murray 2014), the role of revolving door mechanisms (Van Apeldoorn and De Graaff 2014) and their ties with policy planning, lobby and NGO networks (Domhoff 1975, Carroll and Sapinski 2010, Richardson *et al*. 2011). A fruitful combination of large-scale big data approaches with detailed process tracing approaches hold the promise of significant progress for those interested in the dynamics of the structure of the global economic order, and what it means for politics, policy and people.

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Supplemental data

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