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## The cohesion of intercorporate networks in France

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### Abstract

In France, main companies nurture a high number of interlocking directorates. We run descriptive analyses on the 125 largest capitalizations at the Paris Stock Exchange, in order to highlight the economic and social factors driving this phenomenon. On the one hand, the governance network reflects a preference among directors of the same profile, suggesting a mechanism of bounded solidarity. On the other hand, it is included in the capital network, whose major shareholders are mostly foreign investors. We argue that the cohesion of corporate networks based on interlocks might decrease during next years.

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*Keywords:* Social network analysis; corporate networks; interlocking directorates; governance; business elite; capital network; cross-shareholdings; equity linkages

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### 1. Introduction

The cohesion of French intercorporate networks is more problematic than ever. Interlocking directorates are more cohesive in France than in most Western countries (Windolf 2002). An interlock (or interlocking directorate) occurs, when the director of a company sits in the board of another company. Following P. Bourdieu (1989), scholars generally underline the homogeneity of French business elite and the presence of numerous former bureaucrats at the top of main French companies. Social reproduction is thus alleged to be the underlying mechanism of cohesion. Though, such an assertion contradicts the fact that French economy is supposed to be a financial market economy. Since the late 1990s, the French economy has experienced policies of financialisation and an increasing part of foreign investment in the capital of its main companies. We may then question the sustainability of interlocks cohesion under such conditions. Are former bureaucrats still so central in corporate networks? What is the structure of capital networks? Does it allow the persistence of their power?

Our approach is based on a comparison between the governance and capital networks of the major 125 French companies at the Paris Stock Exchange. Studies generally focus on either interlocking directorates (Windolf 1999, Kadushin 1995, Dudouet et al. 2007) or equity linkages (Morin 1993, 2000). Those on interlocks emphasize the weight of social mechanisms, whereas those on equity linkages conclude that economic and political factors as protectionist interests prevail. However while directors and shareholders are closely interdependent, these different factors may be intertwined. They may all impact the structure of corporate networks. We successively present the last transformations of corporate networks in France, the objectives and the methodology of the research. Then, we

study the ties among interlocking directors, before jointly analyzing governance and capital networks, and we discuss at last the results.

## 2. Context

Corporate networks in France demonstrate strong peculiarities compared to those in other main Western countries. P. Windolf analyzed interlocking directorates in Europe and the United States (2002). Among the 374 main firms in France, fewer are interconnected; isolates represent a bigger share (43%) than in Germany (32%), and mostly than in the United States (14%) and in the United Kingdom (8%). However interconnected firms are more integrated than in the other countries. The density among firms with ties is higher (4.92) than in Germany (4.21), in the United States (1.89) and in the United Kingdom (1.53). These firms do not only exhibit more interlocks, but also more multiple interlocks among each other. The proportion of multiple relationships (20%) is rather high. Moreover interlocks in France seem to be more centralized, as the firm with the highest number of interlocks in these countries is French. In brief, the French corporate network has the most cohesive core.

Two models emerge (Windolf 1999): the Anglo-American model and the Franco-German model. In the United States and in Great Britain, ownership is far more dispersed and the weight of institutional investors is more important than in Germany and in France. Further, interlocks form a very dense core in France and in Germany as opposed to the corporate networks in the United States and Great Britain. In Germany, this network intersects the ownership network to a great extent, whereas in France the overlap is weaker, but varies in function of the share of owned capital. French capitalism presents very specific patterns even compared to Germany: control relies on different social mechanisms. In Germany, control stems from a joint-regulation based on ownership interlinkages among non-financial firms. In France, interlocks are structured in particular by state regulation and family capitalism. The state bureaucracy exerts its influence thanks to shareholdings and *pantouflage*. “*Pantouflage*” refers to bureaucrats (from ministries, prefectures, embassies, high administrative bodies, etc.) leaving the administration to work in the private sector. Besides, familism is stronger in France than in other main Western countries. As a consequence, the French ownership network is hierarchical and pyramidal, whereas it is star-like in Germany and inverted star-like in Great Britain and in the United States (Windolf 2002).

M. Morin scrutinized the structure of French capital networks. In the 1990s, he highlighted the importance of financial cores and poles. The ownership network was clustered around the major banks, which owned large shares of main industrial groups. Three kinds of ties coexisted: intermediation ties among banks inside the financial core, alliance ties among industrial groups inside financial poles, and control ties inside business groups. Brokering main cliques of financial and industrial companies, the state played the role of an overwhelming ruler. This dominant position may have weakened with financialisation and globalization. As financial markets were liberalized, the share of foreign investment increased. However French capitalism exhibits paradoxical evolutions. Between 1998 and 2006, while the share of foreign investment increased to represent about 40% of the capital of CAC40 companies, interlocks became more cohesive (Agardi and Alcouffe 2007).

Scholars deduce conflicting arguments from these evolutions. To P. Windolf (2002), the French model may demonstrate stability thanks to the strength of multi-level networks, with the state bureaucracy at the highest level, and of familism. To M. Morin (2000), the French model is on the contrary converging towards the shareholder value model, since privatizations, financialisation and globalization lead to a disintegration of financial cores: Foreign investment now represents a higher share than cross-shareholdings in the capital of main French business groups. In a broad outline, we may sketch these perspectives as the sociological and the economic points of view. The first argument complies with the social reproduction theory, whereas the second point of view supports the convergence theory, as it principally concentrates on equity linkages. Focusing each on different dimensions of intercorporate networks, they draw opposite conclusions from the same evolutions.

## 3. Objectives

This study results from an exploratory research, whose objectives are rather to draw hypotheses and new directions than definitive conclusions. It relies on a comparison of capital and governance networks among major French companies. The capital network shows how convergent the interests of shareholders. In contrast, interlocks represent the communication network among board members, who may talk with each other (at least) during board

meetings. Interlocks are a factor (and a sign) of business elite unity and may help them mobilize to defend their interests. However the subjective interests of directors, reflected by interlocks, may not match the objective interests of shareholders, reflected by shareholdings. We adopt a 2-step approach to illustrate both the social and the financial logics of interlocking directorates. Firstly, we analyze the network of interlocking directors to evaluate if they cluster according to certain characteristics. Secondly, we assess to what extent capital and governance networks overlap.

Studies on interlocking directorates are widespread in the field of social network analysis (Mizruchi 1996). They belong to a broader approach called affiliation network analysis. Its specificity resides in the dual nature of these networks. They do not only include one type of actors, but two types: in general individuals and groups. In contrast with usual 1-mode networks comprising only individuals (or more rarely groups or organizations), they are referred to as 2-mode networks. The implications of their duality for empirical analysis were brightly established by R. Breiger (1974). In the case of interlocks, we face both organizations and directors: directors are connected thanks to board memberships and organizations are connected thanks to common directors. Both interindividual and interorganizational networks are the two sides of a single phenomenon. Interlocks are triggered by interorganizational strategies as well as relational motives, which may be intertwined and even interact. In this light, we introduce both levels in the analysis. To compare interlocks with shareholdings may enlighten interorganizational mechanisms, whereas to evaluate how homophilous the linkages are among interlockers may enlighten interindividual mechanisms.

Boards are in charge of monitoring and controlling the decisions taken by the chairman and chief executive, so as they comply with the interests of shareholders. Their members are elected at the combined ordinary general meeting. Before the Law on New Economic Regulations in 2001, the chairman and chief executive were traditionally all-powerful. Both functions were rarely differentiated. Board members were moreover nominated following the recommendations of the chairman/chief executive. The NRE Law was intended to improve the governance of large French companies thanks to more collegiality. It reduced the number of concurrent appointments as a director an individual may hold, limiting it at a maximum of five appointments. We do not intend in these analyses to judge if interlocks promote conservatism or efficiency. Both arguments could be defended from social capital theories. The following analyses are rather descriptive and aim at bringing new elements in the stability *versus* convergence debate on the French model.

#### 4. Methodology

The data set includes the 125 largest French firms at the Paris Stock Exchange in 2008. Firms are selected according to their capitalization, their nationality (French), and their presence at the Paris Stock Exchange. The capitalization criterion may be discussed, as the capitalization of a company may depend on financial markets as well as on its size and performance. However this criterion appears more relevant than turnover or employees, which are very specific to economic sectors. The data set provides information on board members, who may sit in *conseils d'administration*, *directoires* or *conseils de surveillance*, and on main shareholders at 12/31/2006. It does neither comprise ArcelorMittal, Dexia and STMicroelectronics, whose holdings do not stand in France, nor state-owned companies, as SNCF and La Poste, family-owned companies, as Auchan, mutual companies or savings banks. Consequently, we are not able to extend our conclusions to “the largest companies in France”. Nonetheless these criteria are a guarantee of homogeneity, regarding the way boards are composed. For the recruitment of board members in state-owned or family-owned companies obeys different rules. Further, we selected firms, whose capitalizations were over one billion €. In a larger data set, it would have been more difficult to compare firms, because of their too dissimilar sizes.

We mainly focus on three networks: interlocking directorates, shareholdings, and direct equity linkages. The two first networks are 2-mode networks, which can be transformed into 1-mode networks of firms or of directors/shareholders. The third network is directed, whereas the two others are undirected. Firstly, we study the connections and the attributes of interlockers, in order to evaluate how interlocks may depend on social processes. Secondly, we compare governance and capital networks. The capital network is rarely analyzed jointly with the governance network. It is interesting to study the ownership structure beyond direct equity linkages, which are more commonly studied in the literature. Indeed it provides information on shareholders and their connections through common shareholdings. A large part of common shareholdings may suggest a community of interest.

We run network analysis thanks to Pajek (see de Nooy et al. 2005). Two main features of networks are analyzed: their cohesion and their connectivity (see Wasserman and Faust 1994). Cohesion depends on the number of ties. Density translates the number of ties divided by the maximum number of potential ties. The larger a network, the less dense in general. Besides we consider the nodes in the networks, which stand at the most advantageous positions. Three measures of centrality are commonly used: degree, closeness, and betweenness. In intercorporate networks, degree means the total number of interlocking directorates or cross-shareholdings of a company. In an undirected network, a high degree may translate strong activity as well as strong attractiveness. In the case of individuals, degree means the total number of board members with whom he or she may sit according to his or her appointments. A high degree may then mean numerous appointments and a high status inside business elite. It also indicates a wide personal network. The two other centrality measures are principally used in this study to assess the power of directors. Closeness refers to how close a director is respectively to other board members. The directors with a high closeness might be able to quickly convey information. Betweenness assesses the extent to which an actor may benefit from a brokering position. The directors with a high betweenness might be able to control interactions among other board members.

Connectivity translates another property of networks. Component analysis enables to assess how interconnected a network. A component is a subset of nodes, which are interconnected thanks at least to one path. If there were numerous small components among firms, it would signify a weak capacity of communication and coordination. An isolate is a disconnected node. The average distance among nodes can be calculated only inside a component: it refers to the mean of the shortest paths between each pairs of nodes. A short average distance among firms interconnected thanks to interlocks may suggest an efficient communication network.

## 5. Analyses

### 5.1 Interlocking directors

Globally, the selected firms have more than 1 600 board members. The interindividual network of interlocking directorates is less cohesive (1.4%) than the intercorporate network (see below), partly because it is 13 times larger. Its main component, whose density is 1.6%, gathers about 90% of the board members. The other components are the board members from isolated firms. In the main component, the average distance is rather low (3.6) and the highest geodesic distance, the diameter of the component, is 8: its board members are rather close. The degree centralization is high (0.09). The directors who have the highest degree are Henri Proglion (151), Georges Chodron de Courcel (140), Louis Schweitzer (135), Franck Riboud (102) and Charles de Croisset (100). The closeness centralization is higher than in the intercorporate network (0.28 against 0.10), to a greater extent than the betweenness centralization (0.11 against 0.08). Betweenness varies from 0 to 0.11 and its distribution is slightly different from the degree distribution. According to betweenness distribution, the most central directors are decreasingly Georges Chodron de Courcel, Henri Proglion, Louis Schweitzer, Bertrand Jacquillat and Stéphane Richard.

However degrees in this network may depend on board sizes. And every board member may not belong to the business elite. It appears thus interesting to focus on interlockers, who are 231 (14% of the board members). Their cohesion is far higher (6.2%) and the average distance (2.7) is slightly shorter. Degree distribution among interlockers also differs: George Chodron de Courcel comes first (53), then Henri Proglion second (51), Michel Pébereau third (39), Baudouin Prot fourth (38), and Louis Schweitzer fifth (36). In this perspective, let's focus on the directors who belong to the core of this network, those sitting in more than 3 boards. The biggest part of this elite core (43%) are alumni from most prestigious *grandes écoles* (often X or/and ENA), and led a similar career with a few years spent in the state bureaucracy (generally in a ministry, the Treasury, or a cabinet) and a first position in a big company high ranking. We refer to them as the "bureaucrats" (diamonds in Fig. 1). The second category (36%), the "managers" (boxes), achieved their career in the private sector, having generally climbed up the corporate ladder. The third category (21%) gathers "heirs" (ellipses), who inherited and developed a family business group.

In this elite core, the density is very high (22%) and the average distance very short (2.0). Directors are averagely able to reach any other director (except Patrick Sayer) thanks to only one intermediary. And they benefit from many paths to communicate. When the strongest ties, representing at least two common board memberships, are extracted, we obtain four components (see Fig. 2), in which directors apparently cluster in function of their profiles. Indeed components are rather homogeneous towards profiles, reflecting a preference among directors of the same category.

A social logic does drive interlocks. There may be a bounded solidarity mechanism inside subgroups of directors, in particular among those sharing a similar background.

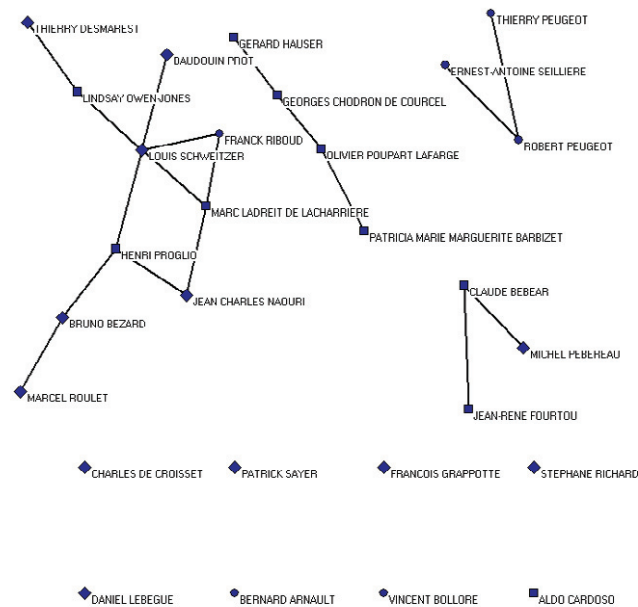


Figure 1: Double common board memberships among main interlockers

Note: diamond = bureaucrat; box = manager; ellipse = heir

## 5.2 Governance and capital networks

The density of the 2-mode network of interlocking directorates is obviously close to the previous network density (1.3%). The main component (the only one with several companies) has a diameter (16) and an average distance (7.0) twice bigger than the 2-mode capital network. The resulting 1-mode network contains 342 ties representing one interlocking directorate and 71 ties representing at least two interlocking directorates. Among the multiple relationships, 53 ties represent 2 interlocking directorates, 13 ties 3, 2 ties 4, 1 tie 6, 1 tie 7 and 1 tie 8. Its density is 5.3%. The main component comprises 107 companies (86% of the 125 companies), among which the average distance is 2.8. Among the 374 firms studied by P. Windolf (2002), only 43% belonged to the main component. The larger firms are, the more likely they consequently are to have at least one interlock. This cohesion may be explained thanks to the relative centralization of the network. A few firms are very central: in particular BNP Paribas (with a degree of 27), Lagardère (24), Veolia Environnement (22), Accor (20) and Thales (18). BNP Paribas benefits not only from the highest degree, but also from the highest betweenness and closeness. Other banks and insurances do not have such central positions in the governance network as opposed to their position in the capital network.



outdegree centralities. Their distribution is very different. Indegrees are comprised between 1 and 13, while most firms have indegrees between 4 and 7. Vivendi, Total, and Accor exhibit the highest indegrees: they attract the highest number of cross-shareholdings. In contrast, outdegrees are comprised between 0 and 112, while most firms have outdegrees lower than 6. The banks and insurances previously cited for the 2-mode network have the highest outdegrees: they are those which invest in the highest number of firms out of the 125.

Reciprocal cross-shareholdings form 3 cliques (see Fig. 3). The biggest, which is the capital network core, comprises only banks and insurances. They are all interconnected. The second component connects Total and Areva, which are both strategic for the energy independence of France. The third component (Bolloré and Financière de l’Odet) represent a business group controlled by the French entrepreneur, Vincent Bolloré. Given the “hard cores” policy of the French minister of finance, Edouard Balladur, in the 1990s, we might have expected more numerous reciprocal cross-shareholdings. If a strongly interconnected financial core remains, the financial poles may have essentially disintegrated. Further, the network of reciprocal cross-shareholdings does not perfectly match interlocks. Only a few interlocks coincide with reciprocal cross-shareholdings (See Fig. 3). Apart from multiple interlocks, only 4 interlocks out of 11 overlap reciprocal cross-shareholdings: those between Total and Areva, Bolloré and Financière de l’Odet, BNP Paribas and AXA, and Natixis and CNP.

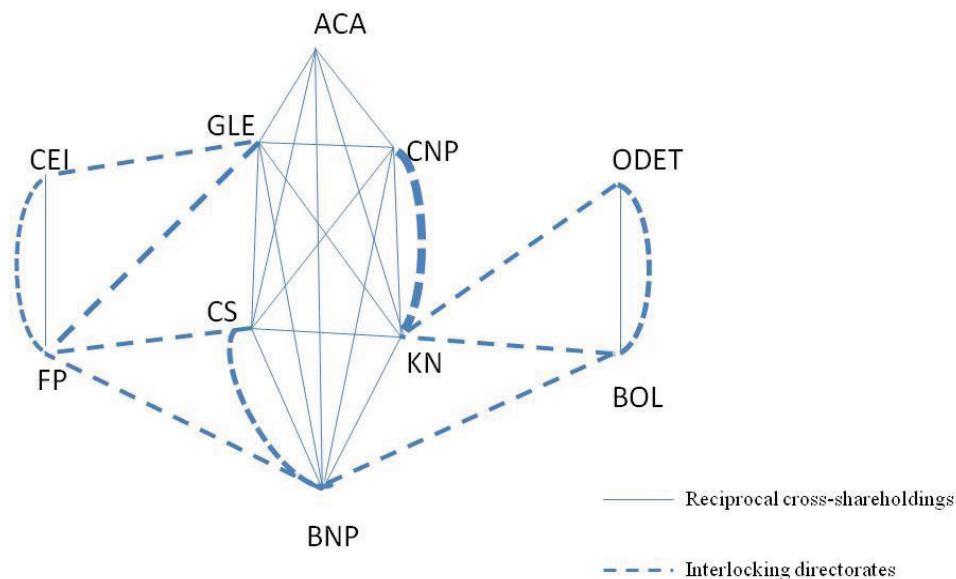


Figure 3: Reciprocal cross-shareholdings and interlocking directorates

Note: Tie width varies according to the number of interlocking directorates among companies. Firms are listed with their labels in Appendix.

Given the extremely high density of the capital network with common shareholders, interlocks are nearly all included in it. However interlocks correspond only partly to cross-shareholdings. The capital network is more centralized. Banks and insurances stand at the most central positions, while they are not so central in the governance network, except BNP Paribas. Similarly, interlocks intersect only partly reciprocal cross-shareholdings, which involve stronger ties. Most reciprocal cross-shareholdings occur among banks and insurances and shape a strong financial core. These intermediation ties do not seem to require interlocks. Interlocks may thus also rely to a great extent on a financial logic, but their spread in intercorporate network does not only respond to this reason.



## 6. Discussion and conclusion

Both economic and social mechanisms play a role in corporate networks. To analyze jointly governance and capital networks is thus interesting to better understand the cohesion of interlocking directorates among major companies in France. While a multilevel analysis would be necessary to disentangle these effects, our descriptive study permits to reevaluate the stability *versus* convergence debate on the French model. In accordance with previous studies, certain former bureaucrats still benefit from very central positions in the governance network, which may be related to the role of status and legitimacy in the selection of board members. To focus on main interlockers does not enable to catch the recent evolutions of business elite: most prestigious directors are often “old school” directors. The centrality of these former bureaucrats illustrates the persistent weight of the state in the French economy. It is also reinforced thanks to a bounded solidarity mechanism: board members may co-opt each other according to similar background and friendship ties (Kadushin 1995). Their brokering positions allow them to coordinate with other actors from the business elite -bureaucrats, managers, heirs, and financial entrepreneurs- as well as from the top of the state, which might profit their company. Dudouet et al. (2007) assert that privatizations have enabled former bureaucrats to strengthen their positions in the governance network, since the late 1990s. Capital dispersion is also supposed to have favored their power, as control over governance may have thus been diluted. But such strategies might turn out to be short-termed. Actually the cohesion of national business elites principally relies on the state. While the capital of major “French” companies increasingly belongs to foreign investors, business elite might become less homogeneous. The profiles of directors might evolve and former bureaucrats might lose their central positions.

Beyond interlocks, the cohesion of intercorporate networks also relies on common shareholders and cross-shareholdings. Most of the 125 selected companies are interconnected thanks to common main shareholders. The capital network is far more cohesive than interlocks. Reversely investors share the same interests thanks to their shareholdings. It may suggest an opportunity for coordination, notwithstanding that they are also connected by their ownerships in other foreign large companies. In spite of capital dispersion, they could collectively exert great control over major French companies. Besides, coordination may be based on other linkages than interlocks, as shown by the financial core. Even if capital has become more dispersed since the late 1990s, a strong financial core is still visible. Main banks and insurances are interconnected thanks to reciprocal cross-shareholdings, while they cultivate few interlocks. Interlocks are not necessary for coordination. They might decrease, given the importance of foreign investors in the capital network. The stability of the French model might be temporary, though it does not mean that the French economy will converge toward the shareholder value model. The role of “global” investors might not be limited to an exit strategy in case of unsatisfactory performance. Further research should be performed to shed light on their connections and to better assess their influence.

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## Appendix

|       |  |      |                              |
|-------|--|------|------------------------------|
| Label | Company name   | HAV  | HAVAS                        |
| AC    | ACCOR  | HO   | THALES                       |
| ACA   | CREDIT AGRICOLE S.A.                                 | ICAD | ICADE                        |
| ADP   | AEROPORTS DE PARIS                                   | ILD  | ILIAD                        |
| AF    | AIR FRANCE - KLM                                     | IPN  | IPSEN                        |
| AI    | AIR LIQUIDE  | KN   | NATIXIS                      |
| AKE   | ARKEMA   | LG   | LAFARGE                      |
| ALO   | ALSTOM S.A.  | LI   | KLEPIERRE                    |
| ALU   | ALCATEL-LUCENT S.A.                                  | LR   | LEGRAND                      |
| AM    | DASSAULT AVIATION                                    | MAU  | ETABLISSEMENTS MAUREL & PROM |
| AMA   | CAMAIEU  | MC   | LVMH                         |
| AN    | CANAL PLUS   | MERY | MERCIALYS                    |
| ANF   | ANF  | MF   | WENDEL                       |
| APR   | APRIL GROUP  | ML   | MICHELIN                     |
| ARR   | AUTOROUTES PRR                                       | MMB  | LAGARDERE SCA                |
| ATO   | ATOS ORIGIN  | MMT  | METROPOLE TELEVISION         |
| BB    | BIC  | MTU  | GROUPE MANITOU B F           |
| BEN   | BENETEAU   | NEO  | NEOPOST                      |
| BH    | BONGRAIN   | NEUF | NEUF CEGETEL                 |
| BIM   | BIOMERIEUX   | NEX  | NEXANS                       |
| BN    | GROUPE DANONE  | NK   | IMERYS                       |
| BNP   | BNP PARIBAS  | NXI  | NEXITY                       |
| BOL   | BOLLORE  | ODET | FINANCIERE DE L'ODET         |
| BVI   | BUREAU VERITAS                                       | OR   | L'OREAL                      |
| CA    | CARREFOUR  | ORP  | ORPEA                        |
| CAP   | CAP GEMINI   | PAJ  | PAGESJAUNES GROUPE           |
| CC    | CIC  | PP   | PPR                          |
| CDI   | CHRISTIAN DIOR                                       | PUB  | PUBLICIS GROUPE              |
| CEI   | AREVA  | RAL  | RALLYE                       |
| CLR   | CLARINS  | RCF  | TELEPERFORMANCE              |
| CMA   | CIMENTES FRANCAIS                                    | RCO  | REMY COINTREAU               |
| CNP   | CNP ASSURANCES                                       | RE   | COLAS                        |
| CO    | CASINO, GUICHARD-PERRACHON                           | RF   | EURAZEO                      |
| CS    | AXA  | RHA  | RHODIA                       |
| DBG   | DERICHEBOURG   | RI   | PERNOD RICARD                |
| DEC   | JCDECAUX   | RIN  | VILMORIN & CIE               |
| DG    | VINCI  | RMS  | HERMES INTERNATIONAL         |
| EDF   | EDF  | RNO  | RENAULT                      |
| EF    | ESSILOR INTERNATIONAL                                | RXL  | REXEL S.A.                   |
| ELE   | EULER HERMES   | SAF  | SAFRAN                       |
| ELEC  | ELECTRICITE DE STRASBOURG SA                         | SAN  | SANOFI-AVENTIS               |
| EN    | BOUYGUES SA  | SCHP | SECHE ENVIRONNEMENT SA       |
| EO    | FAURECIA SA  | SCR  | SCOR SA                      |
| ERA   | GROUPE ERAMET  | SECH | SECHILLENNE-SIDEC            |
| ERF   | EUROFINS SCIENTIFIC SA                               | SGO  | COMPAGNIE DE SAINT GOBAIN    |
| ES    | ESSO S.A.F   | SIL  | SILIC                        |
| ETL   | EUTELSAT COMMUNICATION SA                            | SK   | SEB S.A.                     |
| FDL   | FDL  | SO   | SOMFY SA                     |
| FDR   | FONCIERE DES REGIONS (G.F.R.)                        | SU   | SCHNEIDER ELECTRIC           |
| FFP   | SOCIETE FONCIERE FINANCIERE ET DE PARTICIPATIONS-FFP | SW   | SODEXHO ALLIANCE             |
| FGR   | EIFFAGE  | SZE  | SUEZ                         |
| FIM   | F. MARC DE LACHARRIERE - FIMALAC                     | TEC  | TECHNIP                      |
| FLY   | SOCIETE FONCIERE LYONNAISE                           | TFI  | TELEVISION FRANCAISE 1       |
| FMU   | FONCIERE DES MURS                                    | TMS  | THOMSON                      |
| FP    | TOTAL S.A.   | UBI  | UBI SOFT ENTERTAINMENT       |
| FR    | VALEO  | UG   | PEUGEOT S.A.                 |
| FTE   | FRANCE TELECOM                                       | UL   | UNIBAIL-RODAMCO              |
| GA    | COMPAGNIE GENERALE DE GEOPHYSIQUE-VERITAS            | VCT  | VICAT                        |
| GAZ   | GDF  | VIE  | VEOLIA ENVIRONNEMENT         |
| GBB   | BOURBON  | VIV  | VIVENDI                      |
| GDS   | GENERALE DE SANTE                                    | VK   | VALLOUREC                    |
| GFC   | GECINA   | VOR  | SEQUANA CAPITAL              |
| GLE   | SOCIETE GENERALE                                     | ZC   | GROUPE ZODIAC                |