

THE WEIGHT AND ROLE PLAYED BY LISTED COMPANIES: A DISCREPANCY BETWEEN STATISTICAL AND STRUCTURAL INDICATORS

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Abstract

Most studies on ownership structures at industry or geographic level limit the analysis only to listed or public companies. This choice is due to the paucity of data concerning limited liability companies and it is usually justified by the supposition that listed or public companies account for the major part of the economic variables. Through an empirical study on the EU28 aerospace industry, we show that while this justification can (partially) work for the statistical dimension, it definitely lacks support when concerning the structural (network) dimension.

1. INTRODUCTION

Most literature on applied analysis of corporate governance and ownership structures focuses only on listed or public companies, even when it concerns entire sectors or countries or even global level (Glattfelder & Battiston, 2009; Vitali, Glattfelder, & Battiston, 2011; Glattfelder, 2010). This is due to two main factors: 1) the paucity of data available on the other types of companies; 2) the assumption that listed or public companies cover the largest part, and thus, they are sufficient to understand all main aspects. Now, the former factor is losing

relevance, because various data providers are trying to give ownership and governance data on all limited companies. Leveraging on this availability, our paper aims at checking the latter factor, that is the assumption that studying only limited companies is sufficient to grasp a reasonably satisfying picture of what happens in a whole industry. Hence, taking the EU aerospace industry as a case study, we will show the degree of representativeness of the group of listed companies (LCs) regarding the whole industry.

We run the analysis either on statistical or structural aspects, and we show a marked discrepancy between the two perspectives in terms of representativeness, relevance and roles. We are aware that the specificity of each industry prevents a tout-court generalization of our results. For instance, EU28 aerospace industry (hereafter EASIN) is high-tech and shaped by the EU28 corporate governance laws, relative diffusion of listed among large companies, and other general structural features, like a firm size distribution different from other world regions. Therefore, it is possible that the same study in the USA or in a low-tech industry in EU28 could produce different results. However, this is the first step in this direction and helps researchers in several fields of study, like corporate governance, financial networks, and strategic alliances through ownership relationships, to extend this analysis to other industries or countries, and to take our findings into account when dealing with only listed companies to represent a whole industry or country.

2. A SHORT SIGHT AT THE EU AEROSPACE INDUSTRY NETWORK (EASIN) AND METHODOLOGY

2.1. A short overview

Though considering that data on employees refers to only 51.2% of companies, EASIN employment is huge: 894,000 people. As well enormous is the total assets, which amounts to US\$618.2 billion, though limited to 65.1% of companies. Turnover amounts to US\$430 billion (but corresponding to only 42.8% of companies), while capital (115 billion) seems more representative than other variables, like the value of assets because it covers 69.3% of companies. Conversely, the value of cash flow (25.7 billion) is the least representative variable (33% of companies). However, besides the warning made in the previous (methodological section), it should be reminded to take all these numbers cautiously because of the hard problem of diversification. In fact, most of these companies — and especially the large ones — are diversified into information and communications technology and other mechanics, while the data does not let to identify only the pure aerospace activities.

2.2. Dataset and methodology

EASIN companies are strictly matching the two criteria of being into EU28 and the aerospace industry (NACE-3030). Because the aerospace

industry requires huge investments in technology, research and development, productive capacity, coordination and commercialization power (Biggiero & Magnuszewski, 2021), we thought that our study had to find and analyse ownership partners of EASIN companies. They can be either from outside the EU28 and/or outside the aerospace sector — some of them may also be from the aerospace sector, but then they will be from another geographical region. We called them EASIN neighbours (hereafter NEIGH) because in the language of social network analysis there are just neighbours of the EASIN network.

Data has been collected via Bureau van Dijk’s *Orbis database*¹, which allows for extracting data on companies with a number of attributes, such as financial, geographical, industrial, etc. The so found approximately 3000 companies — whose actual number is ever-fluctuating depending on the emerging and liquidated companies updated regularly — were additionally assigned their financial attributes (total assets, turnover, number of employees, etc.) and ownership relations (shareholder, participated company or both).

An ownership network is a graph where nodes represent shareholder companies and connections — called also arcs, links or ties — represent shareholding relations. Usually, a weight is associated with each oriented arc, expressing the percentage of shares held by each shareholder. Hence, the focus of our analysis is on the ownership relationships within EASIN, and also between EASIN and its NEIGH. Thus, companies can have participation — whatever its value or percentage respect with the equity capital of the receiver — as a shareholder or can be a participated company or can play both roles².

3. THE STATISTICAL WEIGHT AND THE STRUCTURAL ROLE OF LISTED COMPANIES

3.1. The relevance in EASIN

Listed companies are only 13 out of 365 total companies (Table 1), corresponding to only 3.7%. However, in terms of their ownership share, they cover 68% of all values, corresponding to \$14.4 billion. With the exception of equity capital and turnover — for which LCs cover 36 and 45%, respectively — in terms of the other three economic attributes (employees, assets, and cash flow), LCs cover around 50%. Interestingly, there is only one ownership connection among them, meaning that in EASIN almost each LC is standalone. This attitude is confirmed by topological indexes because binary and weighted betweenness centrality (Bc) is 0, as well as all indexes that “point” at them (In_{Cc} and In_{Dc})³.

¹ Used many times in the referenced literature, despite all its imperfections it is considered a reliable source of data for research.

² Being focused only on companies, shareholders as individuals were not considered.

³ Cc stays for closeness centrality, which in directed networks can differ between in- and out-edges. In_{Dc} and Out_{Dc} means in-degree and out-degree centrality, respectively.

Conversely, they have an Out_{Dc} 0.16 and Out_{Cc} of 3.6. Noteworthy, LCs’ topological relevance is definitely extremely lower than their statistical economic relevance.

3.2. The relevance in the extended network

When we add neighbors, we find 49 more LCs, which are proportionally much less than in EASIN, so that the share of all LCs on total companies halves. Interestingly, 13 out of the 62 LCs are into the main component, meaning that the most important companies operate there. Here, we find a not irrelevant number (29) of ownership connections among LCs, which covers 0.9% of all links. In terms of equity capital, they are 6% of all flows, while the values of ownership shares flowing from the 62 LCs to the other 3465 companies amount to 61%. Further, in terms of all the five economic attributes, they cover more than 64%, reaching 81% for cash flow. If we measure the pure topological relevance of LCs, we notice that Bc is irrelevant, and binary In_{Cc} is about 10 times Out_{Cc} , meaning that many companies indirectly connect to LCs to participate in their equity capital.

Table 1. The relevance of listed companies in EASIN and EASIN + neighbours

| Topological and statistical parameters | EASIN | | | EASIN + Neighbours | | |
|--|-----------|---------|-----|--------------------|------------|-----|
| | Abs. val. | Total | % | Abs. val. | Total | % |
| listed companies as a group | | | | | | |
| # of intra-group links | 1 | 264 | 0.4 | 29 | 3209 | 0.9 |
| # of group links | 58 | 264 | 22 | 923 | 3209 | 29 |
| value of intra-group links* | 0.494 | 21.238 | 2.3 | 14.381 | 236.810 | 6 |
| value of group links* | 14.452 | 21.238 | 68 | 145.489 | 236.810 | 61 |
| group size (# of nodes) | 13 | 351 | 3.7 | 62 | 3527 | 1.8 |
| group value* | | | | | | |
| employees | 0.468 | 0.894 | 52 | 2.675 | 3.670 | 73 |
| turnover | 193.248 | 430.415 | 45 | 1,194.178 | 1,784.746 | 67 |
| equity capital | 42.160 | 117.034 | 36 | 1,254.164 | 1,966.420 | 64 |
| assets | 322.0 | 618.092 | 52 | 11,959.748 | 16,977.967 | 70 |
| cash flow | 14.203 | 25.684 | 55 | 81.143 | 100.753 | 81 |
| group centrality indexes | | | | | | |
| (binary) Bc | 0 | | | 0.001 | | |
| (weighted) Bc | 0 | | | 0.001 | | |
| In_{Cc} | 0 | | | 24.6 | | |
| (weighted) In_{Cc} | 0 | | | 0 | | |
| Out_{Cc} | 3.9 | | | 2.2 | | |
| (weighted) Out_{Cc} | 0 | | | 0 | | |
| Dc | 0.16 | | | 0.2 | | |
| In_{Dc} | 0 | | | 0.04 | | |
| Out_{Dc} | 0.16 | | | 0.2 | | |

Notes: * absolute values in 10⁶ current US\$.

4. DISCUSSION AND CONCLUSION

We applied our study on the case of the EU28 aerospace industry in 2019, for which we gathered data of all limited companies, including listed and public ones. Further, we extended the data and analysis also to the ownership partners of those 3243 companies, resulting then in 5571 companies, out of which 3527 have at least one connection. Our analysis showed clearly a sharp discrepancy, in both the restricted and extended networks, between the statistical and the structural representativeness and relevance of listed companies: while they are very much representative in statistical terms, they are not at all in structural terms. Of course, this conclusion straight depends on the indicators chosen for the representativeness and the relevance, and on the definition of these two concepts. We have proposed to take the mean and the share as the benchmarks of representativeness and relevance, respectively. However, especially for structural aspects, relevance should be accompanied or even can be replaced by the concept of crucial role, which is certainly vaguer than the previous two; but on the other hand, it seems useful and also rather intuitive.

When we consider the statistical dimension, then relevance is evident, because most indicators give them more than 50% of share. However, they seem to be not representative, because those same indicators are distributed according to a scale-free shape, where listed companies are placed at the extreme of their heavy-tail (Biggiero & Magnuszewski, 2021). When considering the structural aspect, then listed companies look representative only in terms of the value of the links sent to or received from the other companies.

If we move the attention to the pure structural aspects, like the number of links, the degree centrality and the betweenness centrality, which are ways to measure direct and indirect influence power, respectively, then we see that they are relevant but not representative in terms of degree centrality, because it is distributed in a scale-free way (Biggiero & Magnuszewski, 2021). Further, there are very few links between listed companies, definitely not representative of the structure and density of the whole network. They are not representative of average connectivity and do not play any crucial role in terms of betweenness centrality.

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