

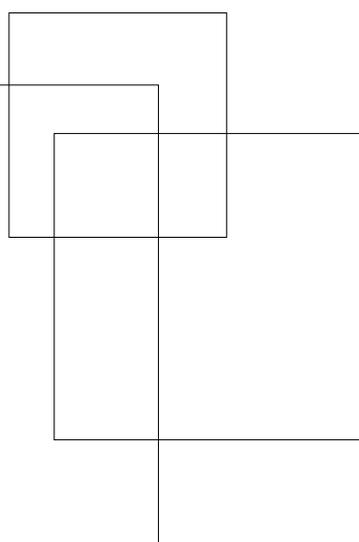


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Global supply chains and intangible assets in the automotive and aeronautical industries

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Abstract

The relocating of Transnational corporations' (TNCs) high-generating value activities at the upper (design, development, branding, Intellectual property) and lower (marketing, maintenance and post-sales services) ends of their Global supply chains (GSCs) and the amazing rise of Intangible assets (IA) in their stock value operate in interaction.

The paper documents the deep transformations in major French automotive and aeronautical TNCs' strategies – in particular in the management of their R&D – in relation with the appeal of IA for financial investors. It thus highlights a further dimension of the relation between finance and production to the ones more commonly addressed by the literature on 'financialisation'.

Keywords : Transnational corporations, Global supply chains, Intangible assets, R&D, Financialisation.

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1. Introduction

This article analyses the relationship between the ongoing phase of globalisation based on the expansion of global supply chains (GSCs) and the growing importance of intangible assets (IA), whether at the upper end (R&D, branding, intellectual property) or the lower end (marketing, maintenance and post-sale services) of the GSCs, a link which has remained a blind spot in the academic research on GSCs until recently. It does so mostly from the results of a case-study analysis of the main French large transnational corporations (TNCs) in the automotive and aeronautical industries¹ and the way they manage their specific GSCs. It is based on quantitative data from corporate annual reports and on qualitative data from in depth interviews with company representatives of management and unions and with public authority representatives in charge of these industries (Serfati and Sauviat, 2018)². The starting point is that GSCs are built by large TNCs. So it is essential to relate the literature on international production, which focuses on the degree of vertical integration with the one concerning the oligopolistic market structure prevailing in most industries.

There is a broad agreement in the GSC literature that, with their minute division of international production in tasks and functions, large TNCs are relocating high-generating value activities (e.g. IA) at the upper and lower ends of their GSCs, a process commonly described as ‘the smile curve’. The rising fragmentation and geographical dispersion of production operations by TNCs, a process that implies increasing trade in intermediate goods and services, has developed along with the growing role of IA, not only as drivers of value growth in final products and revenue (R&D, patents, brands, software, and so on) but also as generators of monopoly power (Durand and Milberg, 2018). The dramatic development of IA can be considered as a result of important changes occurring both in the productive process - including the central role of GSCs - as well as a consequence of the evaluation of public companies’ performances operated by financial markets.

Section 1 starts with a critical discussion of the concept of GSC in the academic literature. It proposes a definition of GSCs through three overlapping but distinct dimensions. The second section highlights from an industrial economics perspective the principal similarities and differences between the aeronautical and automotive industries that have influenced the specific shaping of their respective GSC, notably the degree of globalization and decentralization of their research and development (R&D) activities. The third section analyses how R&D activities as IA are managed by French aeronautical and automotive TNCs within their GSC. It gives mixed results in terms of location (domestic/offshoring) and sourcing (in-house/outsourcing), with significant differences between the two industries. In the fourth section we focus on the management by lead firms of their GSC. This process requires strong inter-organisational competencies, since the system architecture and integration of an aircraft, or to a lesser extent of a car, is based on very specific and not easily duplicable skills (technological and managerial). Inter-organisational competencies, added to the ‘relational power’ resulting of unique interactions between lead TNCs and regulation authorities ruling the qualification and certification of aircrafts and cars, constitutes both high valuable IA and a high barrier for new entrants. In the last section, we propose a theoretical perspective on IA by connecting changes occurring in the production process of TNCs with the one of their financial valorisation. While IA account for the bulk of top listed corporations’ stock value (between 50 and 80%), the way they are evaluated by financial analysts remains somewhat fragile. By doing so, our approach aims at highlighting a further dimension of the relation between finance and production to the ones more commonly addressed by the literature on

¹ Given their economic impacts in terms not only of employment but also of R&D and of external trade spillovers on the French productive system.

² More than 50 semi structured interviews have been conducted between 2017 and 2018 with representatives of management (human resource and strategy) and unions in the top French aeronautical and automotive companies, whether OEMs or First-Tier-suppliers (Airbus, Safran Thales, Latécoère, Stelia, Renault, PSA, Valeo, Faurecia, Delphi), with representatives of central administration in charge of these two industries (DGAC, DGE), with representatives of some engineering suppliers (Altran), with representatives of the aeronautic and automotive professional organisations (GIFAS, FIEV).

‘financialisation’ (focused on the distribution of value-added, dividends and their impact on R&D, innovation, etc.).

2. The three dimensions of GSCs

The concept of GSC has been developed by academics to capture the changes at work in the international division of labor, notably its spatial and productive fragmentation. If the success of this concept is unquestionable in identifying the process of globalization that emerged in the 1990s, some dimensions of GSCs have been neglected by the literature. In particular, the role of large companies in the shaping of GSC has been if not ignored largely underestimated by the mainstream literature in international economics. Yet, large multinational companies control almost 80% of international production and 1/3 of international trade is intrafirm trade (Unctad, 2013), this share being much more important in some developed countries. This is particularly true in the aeronautical and automotive industries where the top world companies have built a global and integrated space through their respective GSC. Intermediate goods and services trade operations, internal financial transactions, as well as the process of value creation, are under control of the TNCs’ holding company. Putting back TNCs at the core of GSCs requires taking into account the oligopolistic structure of most of large and worldwide industries. In his pioneer work, Hymer (1970) made the concept of market power central to his analysis of TNCs’ strategies³. He pointed out the dual nature of foreign direct investment and anticipated subsequent works on GSCs by highlighting that production outsourcing and the focusing on IA (product development and marketing) by TNCs tended to reinforce their control on other firms. Thus financial globalization during the 1980s and 1990s has enhanced the power of TNCs and their control over the creation and the distribution of value at a world level (Chesnais, 1997).

The setting up of GSCs by large TNCs has reinforced their vertical monopolistic power, less analysed however than their horizontal one and also less controlled by regulation authorities (Nachbar, 2013). The international fragmentation of production in GSCs has not only been driven by technological progress (decrease in transportation and communication costs); it has been shaped by TNCs themselves. Their choice between “make or buy” pursues two objectives: 1) an increase in the lead firm vertical power vis-à-vis its suppliers, asymmetric relations allowing the extraction of rents; 2) a better exploitation of the available workforce segmentation on a global basis, which has dramatically increased since the accession of China to the WTO in the early 2000s and the ‘doubling of the global workforce’ (Freeman, 2004).

Whatever the names given by literature and practitioners to the new reality of globalization (global value chains, global production networks, global commodity chains, etc.), GSCs can be defined in our view through three overlapping but distinct dimensions. In other words, GSCs are at the crossroad of three different spaces: a technological and productive space, a strategic space and a value-creation space.

The technological and productive space refers most usually to the process of spatial as well as productive fragmentation of the different and sequential operations (business and functions) that take place along a value chain and contribute together to the production of a final good or service (from conception, production and development of a product until its distribution, maintenance and end-life cycle). This is the more common definition of a GSC that can be found in a large body of research on this topic. Technological interdependence is of course central to the coherence of this space, all the more in the aeronautical and automotive industries where product modularity and component-vehicle interfaces between OEMs and suppliers are key factors in the supply of a plane or a car.

The strategic space refers to the market power (or the bargaining power) acquired by the lead firm vis-à-vis their suppliers, their customers etc., but also to the relational power derived from resources

³ D. Teece (2014) criticized Hymer’s thesis and opposed the argument of efficiency to explain the internationalisation of corporate activities.

(information, knowledge, etc.) obtained from their customers, suppliers, R&D partners and also from public institutions. Taking into account the strategic dimension of GSC allows to observe the extent to which the two industries are characterised both by strong systemic interactions between OEMs and their suppliers, but also between firms and public R&D institutions as well as public regulation authorities. The links established between firms within their GSC entail asymmetric relationships, which are not reducible to arm's length relationships. We consider this space as strategic since it is based both on market and non-market price relationships, often analysed in the academic literature in terms of GSCs' governance, notably by Gereffi and *alii* (2005).

To take into account this strategic space, or in other words this governance space, it has to be recognized that large TNCs hold not only a market power but also what we call a relational power. The control of final markets is decisive for the consolidation of this kind of power. In the aeronautical and automotive industries, the final integration of the product and its delivery to market remains the exclusive role of incumbent OEMs. As architect-integrators, they have a unique advantage vis-à-vis their suppliers or their potential new entrant competitors. Access to final markets is also enhanced by the strong and long-term linkages OEMs have been able to establish with public regulation authorities. The defence industry whose links with the aeronautical industry is well known is certainly emblematic of the relational power accumulated by large aeronautical companies. In the automotive industry, the "Dieselgate" scandal has highlighted the influence of large OEMs on European Parliament and regulation agencies as well as their privileged access to the making of rules, norms and test procedures. The role of this relational power is highly priced by financial markets and constitutes - under the name of 'relational capital' - a major component of IA of large public companies.

Finally, GSCs are a space of valorisation, hence the name of global value chain used by a large part of the literature. With the segmentation of production, value is created through cooperation between firms, while its appropriation remains a private, and competitive issue. Large TNCs capture value produced by smaller firms along the chain and then reap the benefits of the value created by leveraging their relational power in contractual and non-contractual arrangements. OEMs, thanks to their relational power, hold also an asymmetric power with most of their T1⁴. In both sectors however, T1 are on average, more profitable (as measured by the operating margin) than OEMs. T1's higher profitability could arise from various reasons: 'reward' of innovation, as T1 are the propellers in innovation in both industries, ability to 'squeeze up' their own suppliers along their supply chain, etc.

3. Main characteristics of the aeronautical and automotive industries influencing their respective GSCs

The automotive and aeronautical industries are two traditional and mature manufacturing industries which still account for a major part of production and employment (direct and indirect) both in developed and emerging countries. Large companies in these two industries are quite strongly R&D intensive and often at the top of R&D expenses by industry in their home country. Factors explaining the configuration of their GSCs and more particularly of their R&D activities around the world are related to the respective degree of regulation they face, the higher or lesser complexity of their production and technological processes, their specific market structure as well as the size and type of demand that prevails in the two industries.

Table 1 stresses the main similarities and differences between the two industries regarding all these different aspects. First, automotive and aeronautics are both highly regulated by governments, for obvious concern of safety since they transport people and of environmental standards and requirements aiming at reducing the dramatic growth of carbon gas emissions in the atmosphere. In the aeronautical industry, new environmental constraints require more fuel-efficient engines and an increasing use of composite material, which thus enhanced the role of T1 suppliers (engine and components producers)

⁴ In a few cases seen in our study, T1 and even T2 are in a monopoly position of the market they served and a more favourable relation vis-à-vis OEMs.

in the GSC. This is less the case in the automotive industry where the trend towards more fuel-efficient engines does not lead to changes in the balance of power between OEMs and suppliers since the production of engines remains under the control of OEMs and has not been outsourced.

Table 1: Main features of the two industries and of their GSCs

Main Features	Aeronautics	Automotive
<i>Regulation:</i> - Environmental - Security & certification	Increasing requirements Very stringent	Increasing requirements High
<i>Production & Technology process:</i> - Degree of complexity - Product life cycle	System Integrator, thus vertical integration by a lead firm (OEM) Very long (30-40 years)	System Integrator, thus vertical integration by a lead firm (OEM) Long (10-13 years)
<i>Technology:</i> - Disruption trends - Potential impact on new entrants	High (electric plane, drones, etc.) Long-term and on markets' niches	High (Electrical vehicle, connected and autonomous vehicle) More short-term and mainly from High Tech TNCs)
<i>Market</i> - Structure - Dynamism	Ultra-tight and stable oligopoly (Top 4 → Top 2 with Top 2 : 92,4% of commercial aircrafts, 2017) Continuous growth since the 1970s	An enlarged oligopoly with some new entrants (Top 15: 84% of world production, 2015) A succession of ups and downs
<i>R&D:</i> - OECD classification (2015) - R&D intensity (2017 EU R&D scoreboard) - Average R&D life cycle	High Tech intensive R&D intensity: EU, 5 %, non-EU, 3,9% 6-8 years	Medium Tech intensive R&D intensity: EU, 5,5 %, non-EU, 3,7%) 3 years
<i>Demand:</i> - Size: - Structure - World revenue	Small (2 262 aircraft sold (2016) ; Concentrated: 280 airline companies as customers, Top 9: 27% of world demand. € 475 billion	Mass Consumption (95 million new vehicles sold in 2016) Mass demand, but customised € 2 162 billion
<i>Global supply chains:</i> - Degree of globalisation of OEMs - Degree of globalisation of suppliers - OEM-T1 relationships - Major sources of innovation - De-verticalisation trends - Degree of globalisation of OEMs' R&D centres - Degree of globalisation of suppliers' R&D centres	Few foreign subsidiaries Few foreign subsidiaries Work packages and Risk sharing partners (RSP) T1 (and a few T2) Re-internalisation of segments of activities Only a few foreign R&D centres, continuous important role of the home country Only a few foreign R&D centres, continuous important role of the home country	Many foreign subsidiaries Many foreign subsidiaries No RSP, OEM-T1 relationships differ between countries T1 Limited and localised re-internalised activities An increasing global presence of R&D centres but a continuous centrality of the home country A more global presence than OEMs' R&D centres

Source: Authors, from various sources.

Second, the production and technology processes in the two industries are rather similar in that they imply a high degree of complexity. They are both based on modularity, which requires coordination of activities between a lead firm acting as an integrator and sub-systems as well as component suppliers. But since their R&D and product life cycle differ widely, being much longer in aeronautics than in

automotive, the relationships with T1 suppliers are more stable in the aeronautical industry. This led to the setting up of work packages (WP) combined with a system of Risk sharing partners (RSP) between OEM and T1, which do not exist as such (or are not going so far) in the automotive industry. The creation of WP in the aeronautical industry has been coupled with demands made by OEM to their T1 to participate in RSP, that is to associate a restrict number of suppliers during the early phases of a new plane program, with an involvement of the latter in technical and financial risks due to the project of building and designing a new plane. The RSP system has led to the consolidation of mega suppliers, which are required to invest large amounts of money and have to wait in average between 7 and 15 years to get a return on their investment.

The two industries differ also by the length of their R&D cycles and the degree of their R&D intensity. In the case of the aeronautical industry, between 6 and 8 years separate in average the launch of a research program and the industrialisation of the product (a plane) whereas it takes only 3 years for a car. A plane is considered in the OECD industry classification regarding R&D intensity⁵ as a high technological product whereas a car is ranked just below as a medium-high product. This ranking might indeed be questionable since the car industry is becoming more and more R&D intensive today, with the move to connected and self-driving cars and the new key role of software. The two industries are both facing high potentially disruption technological trends. However this trend is rather long-term and focused on targeted segments in the aeronautical industry whereas it is more short term in the automotive industry even if automotive OEMs are undertaking proactive strategies aimed at fending off competitors.

Third, the market structure and the size of demand also distinguish the two industries, with implications on their respective GSC. At the OEM level, the aeronautical industry is a tight and stable oligopoly, quasi-a duopoly (Boeing and Airbus) whereas in automotive, the dominant firms are more numerous, resulting in a less stable oligopoly which has seen a few new entrants from Asia since the 2000s. The aeronautical industry has only a few hundred airlines as customers and its annual sales did not exceed 2 262 new planes in 2016. Airlines are also playing an important role in the early decision phase on Investment by OEMs, included in the shaping of the model, but also in the very profitable “Maintenance, repair and Operations” (MRO) market. Their presence has further increased the role of motorists and component producers in the GSC. By contrast, the automotive industry is really a mass market with ten thousand billion customers and nearly 94 million of new vehicles of all types sold on the world market in 2016. Even if these customers can choose different options and have somewhat freedom in the configuration of their vehicle, the definition of the product, notably the design depends entirely on internal decisions of the OEM and in this process, the cooperation with their suppliers is rather limited⁶.

These different features have of course important implications for the configuration of their respective GSCs: 1) Aeronautical companies have developed only a few foreign final assembly lines (FAL) compared to the numerous FAL of automotive companies located all over the world; 2) Aeronautical companies have established only a few R&D centres outside their home countries compared to an increasing global presence of the R&D network for automotive companies although the home country still has a dominant role; 3) Aeronautical OEMs have established stronger T1 responsibilities and commitments through WP and RSP than automotive companies; 4) While a re-internalisation process of critical segment activities (aero structures, wings, landing gear) is clearly taking place in the aeronautical industry, no similar phenomenon occurred in the car industry where re-internalisation has been much more punctual and limited in size.

⁵ The criteria used in the OECD typology (high, medium-high, medium-low and low technology) is the share of revenue spent on R&D.

⁶ These relationships differ however depending on the country. They are much closer in Germany than in France for example.

4. Aeronautical and automotive TNCs' R&D global strategies as a key component of intangible assets

IA are usually defined as non-monetary sources of probable future economic benefits that lack physical substance, are controlled by a firm as a result of previous events and transactions (self-production, purchase or any other type of acquisition), and may (or may not) be sold separately from other corporate assets⁷. As the items included in IA differ considerably among experts, a widely accepted taxonomy includes three components: human capital (R&D, patents and trademarks, etc.), relational capital (resources arising from the external relationships firms have established with their customers, suppliers or R&D partners), and structural capital which refers to the knowledge that remains in the firm "after the staff leaves at night" (organizational routines, procedures, systems, cultures and databases)⁸. Goodwill is also a major component of IA (see below). It is defined as a premium above the net value of individually identified valued assets and liabilities (roughly its book value) that potential purchasers are prepared to pay for acquiring a company.

The growth of IAs' share in firms' market value - and at the macro-level in the GDP - is amazing. IA accounted for 87% of US S&P 500 market capitalization in 2015, up from 17% in 1975⁹. Our case studies confirm the importance of IA (sometimes called intellectual or knowledge-based capital¹⁰) related to traditional tangible assets (factories, inventory, machinery) in aero in aeronautical and automotive companies¹¹. While their role in the production process has been studied for two decades, the link between the expansion of GSCs and the growing importance of IA has until recently attracted little attention in the academic research on GSCs. Yet, since according to some studies intangible capital captures more value than tangible capital in all manufacturing industries (WIPO, 2017), it is all the more important to refocus analysis on this link. This section addresses one core component of large TNCs' IA: R&D activities and their transformations in the two industries.

In high technology industries as aeronautics and automotive, the role of R&D in the creation of value is essential. R&D is defined by OECD as "the money spent on creative work undertaken on a systematic basis to increase the stock of knowledge and the use of this knowledge to devise new applications. » (OECD website). As firms have to stick to this definition in their accounting procedures, it is still clear from interviews carried out in our research that for business, what does ultimately matter is creating innovation to make their process more efficient and/or their products more profitable. Business approach is thus in phase with the Oslo Manual on innovation, when it considers that "While most R&D is related to product and process innovations, some may be related to marketing or organizational innovations". A consequence is that the main distinction adopted by top management is between Research and Technology (R&T)¹² and the rest of activities dedicated to innovation, including the development phase but also, differing from OECD definition, some segments of marketing aimed at testing the correspondence between the technical feasibility of a new product and its marketability in terms of price. Practically, the gap existing between precise OECD recommendations in measuring R&D and the business vantage point stressing on innovation might explain the discrepancies in the

⁷ Meritum Project, Meritum Project, "Guidelines For Managing And Reporting On Intangibles - Intellectual Capital Report", European Commission, 2002, p.9.

⁸ OECD, "Intellectual assets and value creation: Synthesis report", Paris, 2008.

⁹ Ocean Tomo, n.d., <http://www.oceantomo.com/intangible-asset-market-value-study/>

¹⁰ E.g. for Europe, Meritum Project, *op. cited*.

¹¹ The ratio (Intangible + Goodwill/Tangible asset) varies from over 1 to 4 according to our calculations for the French OEMs and main T1 in the aeronautical and automotive industries (PSA 1,10, Airbus, 1,25, Faurecia, 1,40, Valeo, 1,42, Safran, 2,53, Thales, 4,27) with the only exception of Renault (0,47). It means that the value of IA is more (and in some cases much more) important than the one of tangible assets. We thank Cesar Raviez for collecting the data.

¹² Research & Technology is an expression used in some industries (notably in aeronautics) to include research activities *stricto sensu* as opposed to development activities. Other terms used by business during our interviews are 'advanced engineering' (in the automotive industry) or 'Research & Innovation'.

measurement of R&D expenditures as accounted in companies' annual reports and in OECD classification-based national data¹³. An additional difficulty specific (but not exclusive) to the aeronautical industry – and the related defence production – concerns some 'borderlines activities' such as tooling up and process development (e.g. prototypes)¹⁴.

4.1 Moving downstream but mixed signals of offshoring

R&D content carried out by large corporations is largely downstream-oriented, with close-to-market development gaining momentum. The low level of in-house basic research by aircraft and car OEMs could seem surprising given their knowledge and R&D intensive characteristics. Indeed, large aeronautical and automotive OEMs have set up close links with public research centres and universities to benefit from public research.

Moving to downstream development and to close-to-market R&D projects has for effect to shorten the life cycle of R&D and could be accounted for by shareholder pressures. Externally, they come from investors and the regime of 'Quarterly capitalism'. Internally, the question of cost reduction is not limited to manufacturing activities, but also affects R&D activities, more and more submitted to labour cost per hour benchmarks in some cases. The need to reduce R&D cost is becoming a leitmotiv in the language of some auto managers. Indeed corporate R&D is literally trapped between the finance and the purchase department, putting pressure on components and final products' prices as the dominant objective (and reducing consequently the number of suppliers with whom they work). The purchase direction plays a key role in the supplier selection process and therefore in the selection between different R&D projects based on their financial costs, something that contributes to the move to downstream, more close-to-market development activities.

This move to close-to-market R&D projects can also be related to two other major trends in TNCs' R&D strategy identified in the literature: a) the offshoring of a growing share of their R&D; and b) the sourcing issue, with the observation that TNCs outsource a growing share of their R&D, a process less visible in aeronautics than in automotive. Indeed, there are a number of drivers addressed in the literature that explain R&D offshoring, including the need to adapt products to foreign markets and manufacturing circumstances, the stimulus given to home country knowledge by tapping into foreign technological and skill capabilities (home-base augmenting), the need to co-locate manufacturing and R&D facilities (Kuemmerle, 1999). There is now a large body of evidence that R&D activities, once to be said hard to offshore, are somewhat following the trend of production activities.

However, our research gives mixed signals on R&D offshoring trends, with significant differences occurring in the two industries. In the aeronautical industry, R&D remains overwhelmingly performed in TNCs' home country. The offshoring of two important Final assembly lines (FAL) by Airbus (in the USA and in China) have not been accompanied by the creation of local R&D centres¹⁵. Likewise Safran, despite offshoring a significant share of its engine production, continues to concentrate the bulk of its R&D in France.

The evolution is different in the automotive industry. Carmakers and top suppliers have been offshoring their R&D for years, notably development activities to adapt their products to local markets but also for T1 to fit with worldwide OEMs platforms. The French automaker Renault pursued a strategy of decentralizing its R&D, based on a multi-domestic organization as highlighted by Pardi (2017). The group has offshored a number of development centres aimed at adapting products to local market and market launch. This shift reflects a new stage of R&D globalization that took place during the 2000s, involving several emerging countries as new and major R&D centres (competencies and knowledge). It is based on what is known as 'reverse innovation' (Immelt and *alii*, 2009) or 'frugal innovation'

¹³ Interview with accounting audit experts.

¹⁴ See OECD (2015).

¹⁵ It is also the case for Boeing who keeps a large share of its R&T facilities in the US.

(Zeschky and *alii*, 2014). Renault has been at the forefront of this strategy. For the first time in the industry, a new model (Kwid) was produced and launched in India. It was the first vehicle coming out of a new and common platform between the two partners of the Alliance, Renault and Nissan and from the outset aimed at being conceived on a global perspective and duplicated progressively in different emerging countries and regions of the globe (Jullien and *alii*, 2016 and Midler and *alii*, 2017). ‘Reverse innovation’ relies on a mix of decentralised engineering network and also on an accumulation of technological and knowledge capabilities coming from the home country central R&D centre. At present, the central Renault R&D centre still concentrates 90% of the research and advance engineering activities, in contrast with development activities run by foreign technical centres facilities in Romania, India, Korea and Brazil. Also significant is the recent acquisition by Renault of France’s Intel R&D activities and its 400 engineers, in an effort to cope with the growing importance of software in the value of a car (25%), winning thus a couple of years in the acquisition of competencies needed in connection and embedded software for future autonomous vehicles. This acquisition reinforced the weight of high-tech capabilities in France, allowing the two Intel R&D centres to work closely with the central Renault R&D lab (Technocentre). Likewise, while adopting an extensive decentralization of development activities, Valeo kept core technological competencies in France until now.

As for R&D outsourcing, the other trend identified in the literature, our findings are again sending mixed signals. In the automotive industry, French OEMs and T1 suppliers tend to outsource a growing part of their R&D to engineering companies (Akka, Alten, Altran, Segula, etc.) for two reasons: to meet the orders, in terms of production capacity; to satisfy some missing specific competencies. In aeronautics, R&D outsourcing has been mainly concentrated at Airbus and at a few top T1s. In recent years, re-insourcing activities that had been previously outsourced to engineering companies has been used by Airbus to limit the significant size of cuts carried out in its internal R&D workforce.

4.2 The centrality of the home country for R&D activities

While changes in development activities – as distinct from research - have been addressed above, the role of the home country for large TNCs’ R&D activities must not be underestimated. There is a broad agreement to consider that for most TNCs, the home country continues to be important for some core or strategic activities, and among them ‘advanced research’ (Winter, 2010, Dosso and *alii*, 2017). Our study on the top world French TNCs in aeronautics and automotive confirms the continuing core role of home countries’ R&T facilities dedicated to advanced research and/or transverse technologies¹⁶. One obvious reason is that the design, concept, and definition of systems (whether an aircraft or a car) are high-demanding skill capabilities, that over decades have been accumulated through codified (e.g. in standards) but also essentially through uncoded knowledge in the country of origin’s facilities. This makes these R&T facilities not easily duplicable for learning, cost and organisational reasons. It can be added that even for development activities, outsourcing R&D can easily be jeopardized by the complexity of managing the process throughout the organization (Baier and *alii*, 2013).

Furthermore, firms value the ‘golden eggs’ laid by basic research (Arora and *alii*, 2018), and this is all the more relevant for large TNCs belonging to aeronautics and automotive (categorized as high and medium-high technology industries). They rely mainly on public research organisations (PROs) to meet their needs, including in terms of use of demonstrators and test facilities, and this requires proximity of TNCs’ labs with public institutions. The collaboration between firms’ R&T centres and PROs has little to do with a ‘pure’ market transaction, even if it has to be materialised by financial contracts. Research is a specific labour process as its outcome is knowledge, which requires a strong interpersonal interaction based on publications, conferences, human mobility, etc. A widely documented literature emphasises the central role of proximity in research activities as evidenced by the success of territorial academic and scientific clusters. As small distances add to the efficiency of the collaborative process

¹⁶ In the automotive industry, 2/3 of the two French OEMs R&D expenditures and the bulk of their R&D workforce in 2017 are located at home (52,7% for Renault at the Guyancourt technocentre and 46,4% for PSA distributed among three R&D centres (Vélizy, Poissy and Sochaux). In the aeronautical industry, the bulk of French groups’ R&D is performed in France (and in France and Germany for Airbus).

(Audretsch and Feldman, 1996), proximity is not only a matter of geographic distance, but concerns also cognitive and socio-cultural proximity. Conversely, some studies show that affiliates of foreign firms do not interact with PROs as actively as domestic firms do, probably as a result of their privileged access to foreign technologies in their home country (Fuentes and Dutrénit, 2016).

The role of proximity for large TNCs is not limited to their contact with PROs. The relationships they maintain with public policymakers is also quite essential. As public subsidies are not restricted to national firms but apply also to foreign affiliates, they are nevertheless often designed to reinforce the domestic base of large TNCs¹⁷. In interviews carried out with top aeronautical and automotive industries' TNCs, tax incentives on research have been said by business managers to be quite determinant in the decision to maintain R&D activities in France. The R&D tax credit is as high as 30% of the R&D eligible expenses incurred during the calendar year, up to €100 million, and 5% above this amount. France is thus the most generous OECD country as far as R&D credit tax is concerned¹⁸.

Finally, the centrality of the home country for TNCs' advanced research activities arises from their relationship with production. Despite the growing globalisation of their production, automotive and aeronautical top TNCs keep on a significant part of their production in their country of origin. This is the case for the French TNCs surveyed in our study. Concepts and standards elaborated in upstream research activities require strong interaction with production-dedicated facilities - once and in many cases still - located close to R&D facilities of the same firm. Learning by doing and learning by interaction are two main features of early findings in economics of innovation, while managerial literature also put emphasis on the R&D-manufacturing interaction (Pisano and Shih, 2012). For most aeronautical and automotive French TNCs surveyed in our study, central R&T is geographically close to large production facilities. An additional driver could be for aircraft production and to a lesser extent automotive production that they are engineering-science based industries, where these two types of learning are quintessential for production. This need of proximity could be less relevant for 'science-based' industries, where more abstract, formalised and codified R&D can be carried out in stand-alone units located independently from manufacturing plants (Ivarsson and *alii*, 2017).

5. The management of aeronautical and automotive TNCs' supply chains as intangible assets

This section addresses the role of structural and relational capital, a second core component of IA. The former refers to firms' internal organisational capabilities, while the latter valorises their external relationships. Internal organisational know-how of firms, which increases their economic efficiency,¹⁹ is the main focus of the literature on the management of innovation. It should be added that GSC's governance requires strong organisational capabilities based on the development of inter-firm technical and commercial cooperation. Both aeronautical and automotive GSCs are based on such strong relational and inter-organisational capabilities (Sturgeon and *alii*, 2008) even though they are more important in the aeronautical industry. A reason could be that in aeronautics, there is a higher degree of market concentration at the upper end of the GSC (OEM, T1) and even in some production segments at T2 level (e.g. composites, electric wires, etc.). This results in closer collaboration through long-term contracts between OEMs and T1. They are based on 'work packages', a system organizing the risk sharing and the distribution of responsibilities along the value chain. Therefore a small set of firms makes inter-organisational cooperation in aeronautical production denser and more sustainable, because of the relatively low degree of competition.

¹⁷ Corroborating the domestic-bias of R&D tax incentives, a study found that Special incentives to foreign-owned firms are not an appropriate instrument to attract R&D of foreign-owned firm, see Idea Consult, 2014, *Study on the relationship between the localization of production, R&D and innovation activities Final Report*, ENTR/90/PP/2011/FC, September.

¹⁸ <http://www.oecd.org/sti/rd-tax-stats.htm>

¹⁹ For an estimate of the employment and investment in organizational capital, see Le Mouel and *alii* (2016).

Another reason for the core role of inter-organizational capabilities dedicated to the management of their GSCs in both industries is, as said above, that they are product systems based on modularity and generally associated with technology uncertainty and tacit knowledge (Coronado Mondragon, 2018). The design and production of complex product systems requires strong interactions between other participants contributing to the whole process (firms, research centres). This gives OEMs as system integrators a unique responsibility and a lead role, which is based on strong tacit knowledge competencies. As the organisational learning acquired by system integrators in their GSC illustrates the interactive dimension of the production process, the tacit knowledge upon which it is based is a pervasive resource dispersed across different teams of workers in different firms. In aeronautics, digitalisation of the GSC means adopting the same computer programmes by OEMs and suppliers and setting up virtual platforms accessible to all participants in a supply chain. Digitalisation could help large firms to consolidate their grip on GSCs and increase their rents, as it will also facilitate the transformation into private benefits of positive externalities brought about by intensive inter-organisational cooperation in the design and the production processes. The territorial agglomeration of aircraft production (Seattle, Toulouse, North-West England, Sao Carlos) confirms that knowledge accumulation is a collective process, contributing to powerful organisational and managerial learning for OEMs and large suppliers (Hickie, 2016). In the automotive industry, modularisation of subsystems, which has been developing for years, does not mean the end of intensive and idiosyncratic collaboration between OEMs and T1. As evidenced in a case study on the Air Conditioning system, the definition of the interfaces is neither technologically determined nor the mere result of product architectural choices; it depends on OEMs and supplier's capabilities, knowledge and strategic focus that drive the partitioning of design and engineering tasks and the choice of inter-firm coordination mechanisms (Cabigiosu and *alii*, 2013).

The relational capital held by OEMs in aeronautics and automotive constitutes also a major input to their IA. In both industries, OEMs are not only responsible for the conception and the production of complex products. They hold a power on their final market based on the exclusive assignment of insuring that their products meet the high levels of regulation issued by regulatory authorities. This generates a huge financial value because of reputational benefits in these industries. Customers, who are keen to find a product meeting all regulatory requirements (safety, environmental, etc.) will prefer to keep on relations with the same aeronautical or automotive OEM because of possible occurring 'switching cost' as identified in the literature (Klemperer, 1995)²⁰.

TNCs' relational power is also strong vis-à-vis national regulation authorities. Their global reach, as reflected in the development of their GSC, allows them to circumvent national-based regulations, because of "a systemic gap in the capacity of nation states to address the competitive behaviour of firms operating across national boundaries" (Davis and *alii*, 2018). In both aeronautical and automotive industries, OEMs exclusive relations with regulatory bodies give them a powerful leverage. Those capabilities, accounted as IA (relational capital), also include strong political capabilities, based upon the "Medici Vicious Circle" in which "money is used to gain political power and political power is then used to make more money" (Zingales, 2017). The ability to influence the political decision-making process is a component of what we call TNC's 'relational power'. It gives them a considerable competitive advantage in the management of their GSCs, as OEMs and top suppliers use their organisational, inter-organisational capabilities and relational power to build their GSC as a strategic and value space²¹.

Finally, the contribution of their relational power is also reflected in the capacity to influence customers in their decision-making process. This capacity relies on massive expenditures for activities located downstream their GSCs. They include branding, marketing, sales forces, IP, etc. with the objective to

²⁰ In the aeronautical industry, the edge gained by OEMs through the provision of post-sale services and maintenance constitutes a growing share of their revenues.

²¹ Our view on this point differs from the GVC governance taxonomy proposed by Sturgeon and *alii* (2005), which distinguishes between modular and relational modes of governance. Clearly, those two characteristics are merged in aeronautical and automotive industries and give large TNCs a competitive advantage.

increase brand loyalty and consolidate their customer base. All those expenses aimed at reinforcing TNCs' relational power are highly valued by financial markets through customer-related goodwill. The branding value is however much higher in automotive than in aeronautical companies: it reaches more than \$40 billion in 2018 for the two leading world carmakers (Mercedes and Toyota) but less than half or one third of this value for the two leading aeronautical companies (Boeing and Airbus)²². This reflects not only differences between the two sectors in the size of top companies' revenues, but also the fact that automotive is a mass-market where competition is based on key characteristics as reputation and branding. However top automotive companies' brand value remains very small compared to the GAFA²³.

Another evidence of large TNCs' relational power is reflected in that customer and marketing-related IA value are the primary IA recognized within the automotive industry: together they represent in mergers-and-acquisitions almost 30% of the purchase price in contrast with technology (9,8%) and contract-related IA (0,7%) as calculated by KPMG (2010). We attempted to control for the role of customer and marketing-related IA for the TNCs surveyed in our study. In the literature, S&GA is considered as a proxy for intangible investments performed in downstream stages of the production process (Lev and *alii*, 2009). We then relate S&GA to expenditures allocated to R&D, which by definition are carried out before production, hence in upstream stages of GSC. Thus, we have data on the two ends of TNCs' GSC.

Our findings is that the R&D to S&GA ratio is lower than one in four out of six of the top French automotive and aeronautical TNCs as shown in table 2. As differences in this ratio among firms would require further research, those figures give further evidence of the move operated by large TNCs to downstream activities within their GSC.

Table 2: R&D / Selling + general and administrative expenditures in 2017

Companies	R&D / Selling + general and administrative expenditures
Airbus	1,15
Renault	0,44
PSA	0,38
Valeo	1,27
Safran	n.a.
Thales	0,50
Faurecia	0,39

Source: authors' calculations from annual reports

Further, a ratio lower than one for four firms means that in these industries, characterised by a high degree of R&D intensity, R&D expenditures are much less important for companies than expenses in marketing and sales. This raises the issue of whether expenditures dedicated to branding and marketing could be a substitute to product innovation technology-based, or as Wipo (2013) proposes between "innovation-based products vs. image-based products". Similar debate has also been intensive with

²² It reached respectively \$19,3 billion for Boeing and \$11 billion for Airbus. These figures are given by Brand Finance® Global 500 2018. Brand Finance is a brand valuation and strategy consultancy firm, which "bridges the gap between marketing and finance" (id.). Among various metrics, it provides the value of the trademark and associated marketing IP within the branded business.

²³ In 2018, the brand value of the top three GAFA companies was \$150,8 billion (Google), \$146,3 billion (Apple) and \$120,9 billion (Amazon).

respect to the pharmaceutical industry – the higher R&D intensive industry by OECD standards – criticised for giving priority to promotion over R&D expenditures²⁴.

6. The “Janus” face of intangible assets

All the empirical findings of the previous sections lead us to discuss from a theoretical vantage point the underlying drivers of the spectacular growth of IA, including so-called ‘unidentified intangible’ and goodwill. We thus take some distance with the bulk of the literature on GSC that limits its analysis of the strong rise of IA in large corporations’ balance sheet to the growing role of knowledge in the production process. Of course, Adam Smith’s identification of goods to productive activity and services to unproductive activities has been long dismissed, and it is clear that a number of knowledge-based activities incorporated in the labour process are value creating. Hence, “The accountant is thus showing his maturity if he ceases to use the physical test for deciding whether outlays fall under the heading of ‘asset’ or ‘expense’ (Napier and Power, 1992). This does not imply that knowledge should be considered like synonymous with IAs as they are materialised in financial assets, no more than a productive equipment in operation in a production process can be identified with the property titles (stocks) which constitutes a share of a company’s capital.

Since capitalism as Keynes said is a ‘monetary economy of production’, or in Marx’s parlance is based on capital which, as a social relation is both and simultaneously incarnated in productive (equipment, etc.) and financial assets (e.g. shares)²⁵, we have to think productive and financial factors as being interacting in TNCs strategies. It means that the underlying ‘financial logic’ within TNCs permanently reshapes the management of productive assets. In this context, we propose that IAs are a co-production of large TNCs initiating drastic changes in managing their international production and the ‘financial community’. We define the latter as the set of financial investors (pension, mutual and hedge funds, insurance companies), financial analysts, financial advisors (business brokers), auditors, appraisers, who constitutes the very substance of the functioning of financial markets.

After describing how financial metrics took the helm in firms’ accounting, we assume that the centrality of IA in large non-financial corporations’ (or TNCs) balance sheets reflects the role now played in their strategy by financial criteria and financial-shaped management methods (Serfati,2008).

6.1 Sweeping changes in accounting: financial metrics takes the helm

For the purpose of this section, it is essential to observe that the appeal on IA by financial markets was an integral part of the sweeping changes, which took place in value-for- shareholder corporate governance from the 1990s onwards (Lazonick and O’Sullivan, 2000). The stated objective of accounting reforms addressing IA issues was to provide a better quality of information to investors, something made difficult by the dramatic rise of stock prices, which opened huge gap between corporations’ book and stock values. The explanation was simple: traditional accounting, based on historical costs (HC) was unable to keep with the reality provided by the ‘markets’. Accounting procedures undertook a dramatic reshuffling, with the transition from a system based on HC to a one based on fair value (FV) that is an accounting value mainly priced through financial markets’ valuation²⁶. Note that FV is not identical to stock market price. It constitutes rather an anticipation of

²⁴ For an updating of the debate, see Lexchin (2018).

²⁵ We do not underestimate the strong differences between Keynes and Marx as regards their treatment of the relationships between money and production, but for the purpose of this paper, we refer to remarks made by Keynes crediting Marx for “the...pregnant observation...that the nature of production is not C-M-C’ (C for commodity, M for money, C’ >C), but M-C-M’ (M’ >M), e. g. parting with money for commodity (or effort) in order to obtain more money”, cited in Dillard (1984), p. 424.

²⁶ This change was also reflected in the replacement in 2001 of old International Accounting Standards (IAS) by [International Financial Reporting Standards](#) (IFRS), issued by the International Accounting Standards Board (IASB), a private international standard setting body based in London.

the price that would be paid if and when the transfer of liability happened or, as said by the regulation authority, it is an 'exit price'²⁷. In the early 2000s the measurement changed following the obligation made to the acquiring firm to incorporate the market value of what it paid for the target firm on its balance sheet, and to name "goodwill" the difference between the market value and the book value. These changes reinforced the influence of financial metrics in firms' accounting.

Scholars in accounting criticised this take-over of firm accounting by financial markets (Biondi, 2011). They argue that, since traditional accounting is equipped to address the intangible side of activity through the income statement²⁸, there is no need of creating such new category as 'organisational capital' (featuring as 'unidentified intangible' in firms' books) when a financial statement analysis uses sales, expenses, and property, plant and equipment, along with other information on employees and peer performance to forecast future sales and operating income growth (Penman, 2009). The case is still more compelling with goodwill, simply measured as recalled earlier, as the (generally positive) difference between the price paid by an acquiring company to buy a target company and the value of the latter's firm's book price. Goodwill is thus 'revealed' when business combination takes place. Indeed, the opacity of this item is so high that financial consulting experts consider that "there is no single definition of goodwill that is applicable to all purposes"²⁹, a point, which is widely recognised in TNC annual reports³⁰.

Not only do IAs account for the dominant share of top TNCs' balance sheet, but they are also mainly made up of 'unidentified IA' and goodwill³¹. In the best case this could reflect the 'measurement of our ignorance'³² and in the worst case the erratic (e.g. boom and busts) financial valuation of firms, which are accompanied with narratives based on «a rhetoric [that] can bridge any gap between expectations of value and results» (Froud and *alii*, 2000). For others scholars, the 'discovery' of undisclosed IA and goodwill by financial markets has less to do with the claimed 'market efficiency hypothesis' delivering more accurate information to investors and more with the private benefits gained by different components of the financial community. The latter include the accountants and appraisers whose services are now required at the time of the acquisition (to reappraise the value of the existing assets) and for each period thereafter³³. They also include the then three largest investment banks—Goldman Sachs, Morgan Stanley, and Merrill Lynch — who were enthusiastic supporters of fair value rules for M&As during FASB deliberations on the subject (Allen and Karthik, 2013).

6.2 Influence of finance on TNCs' strategies

With the growing share of their assets made up of IA and goodwill so strictly dependent upon financial valuation, TNCs' strategy became in the two last decades further influenced by finance. The pace set

²⁷ Fair value: "The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date", IFRS 13: Appendix A.

²⁸ "Contrary to current wisdom, cost approach does not require estimating the current economic value of investments, and does not prevent the recognition of investments in intangibles *at their cost*" (italics in the text), see Biondi (2011).

²⁹ Reilly R., CPA INSIGHTS, Spring 2015, www.willamette.com

³⁰ e.g. "The determination of the fair value of the acquired assets and the assumed liabilities which are the basis for the measurement of goodwill requires significant estimates", Airbus Financial Statements 2017, p.21.

³¹ In France, while IA accounted for 74% of blue chips' total stock value (CAC40), the share of the goodwill accounted for 31% of IA, EY – Ricol Lasteyrie Corporate Finance-Lasteyrie, "Profil financier du CAC 40", 25 juin 2018.

³² In a study on Global value chains and IA providing a number of data, the authors conclude that their study "underscores the importance of IA in generating value in global value chain production. However [...] One unresolved question is what precisely accounts for the income attributed to intangibles", WIPO (2017), p.29.

³³ Damodaran A., "Acquisition Accounting II: Goodwill, more plug than asset", Sunday, December 16, 2012, <http://aswathdamodaran.blogspot.com/2012/12/acquisition-accounting-ii-goodwill-more.html>

by 'quarterly capitalism' financial markets-driven has had knock-on effects on TNCs' strategy. Since 2001, goodwill amortisation has been abolished and replaced by periodic impairment tests using estimates of current fair value. The result is that there is a strong managerial propensity not to book economic impairments in a timely manner, and use real activity manipulation such as managing cash flow upward and lowering R&D and other expenditures raising the cash flow (Filip and *alii*, 2015). One reason is that, at odds with what is often claimed, FV reporting does not simply adjust balance sheet assets to reflect changed prices in secondary markets but is also based on estimates, judgments and econometric models (Haslam and Tsitsianis, 2015). As politely put by a major consulting company, "The fair value determination of identified IA relies on a number of important assumptions as well as forecast data, both of which introduce subjectivity into the valuation process" (KPMG, 2010). The top management's 'subjectivity' is often in phase with shareholders' expectations since keeping a high value for goodwill is based upon the capitalisation of expected earnings.

Since a significant share of IA made up of 'undisclosed intangible' and goodwill is not recognised unless there has been a transaction to support IA values in the balance sheet, M&As have become a major lever for top managers to inflate the stock value of their companies. In a one-shot transaction, the balance sheet of acquiring companies increases by a multiple thanks to the high valuation offered by investors, consolidating the top management in its request for higher stock-based compensations and meeting shareholders' objectives, endowed with higher paper wealth³⁴. In 2017, in manufacturing industries, the acquisition price was allocated mainly to intangible assets (41%), goodwill (35%) and to tangible assets (25%)³⁵. That means that in M&As, goodwill as a pure financial premium set by financial markets was almost as much priced as the acquisition of identified intangible assets – related to technology, customers, marketing -. Here it can be seen how productive and financial objectives interact with each other. On the one hand, analysis of M&As generally focuses on the 'productive side - acquiring firms to strengthen competences and efficiency, increasing market's share, and less mentioned in the literature, pre-empting a potential competitor. Large companies often target in their M&A operations high-tech SMEs to consolidate their global supply chain (GSC). On the other hand, in keeping with shareholder-value objectives dominating, companies are seen as a 'bundle of assets' prone to capital gains.

6.3 Some further theoretical considerations on finance and TNCs

Large TNCs cannot be defined, as usually is the case, as being bigger and more internationalised than others. They constitute a category of firms of their own and are better defined as financial groups with industrial activities³⁶. This unique characteristic based on a combination of finance and production is incarnated in their organisational structure: a holding (or parent) company based upon the centralisation of financial assets reflecting the ownership of affiliates, a number of them being in charge of designing and producing goods. By definition, in such a structure, financial control dominates industrial activities³⁷.

The inflation of IA and goodwill in their balance sheets further tightened the grip of finance within large non-financial companies. As showed above, IA is a good case in point, since it illustrates the extent to which transformations in the production process (e.g. the growing role of knowledge in the generation of value added) are permanently reshaped and reformatted by the financial community. That means that the refocusing of leading firms on the downstream and upstream ends of their GSC is not only caused by changes in international production. It is still also motivated by the quest for multiplying rents

³⁴ See "M&A and shareholder activism have become ever more intertwined and we see no impetus changing that fact in the immediate future", J.P. Morgan, "2018 Global M&A Outlook", January, p.26.

³⁵ Burgiss and Bullock (2017), Purchase Price Allocation Study, December. Figures are rounded.

³⁶ The seminal definition of TNCs as financial groups with industrial activities was proposed by a French economist, see Morin (1974).

³⁷ See Sauviat and Serfati (2015), on the role of holding companies in large French TNCs.

income-generating activities located at the two ends of GSC, as widely evidenced by the literature on global value chains (Davies and *alii*, 2018).

The 'financial logic' at work in large TNCs has a major performative role. To give an example, the massive growth of intellectual property facilitated by changes in the institutional regime initiated by the U.S. and extended at the world level by International organisations in the 1990s was instrumental in transforming knowledge, from a 'public good' endowed with large positive externalities due to its non-rival features into a private appropriated good, forbidding the free use of knowledge. Hence, the so-called 'knowledge economy' produces an evident paradox: the non-rival nature of knowledge, which could in principle favour small (even worker-managed) firms, is used to create artificial economies of size that make the cheap acquisition and the defence of property rights possible only for big business" (Pagano, 2014).

Similar remarks on the performative role of financial markets could apply to 'unidentified' (but highly valuable) IA such as organisational and relational capital. The ability of large firms to coordinate the activities of other firms present in their GSC provides them with large advantages. On account of their leading role in the integration of their GSCs they benefit from what is called "natural monopoly forces arising from the complementarities between the participants to the chain" (Durand and Milberg, 2018). "By providing the network with an organizational integration framework, leading integrators occupy a singular position vis-à-vis other participants"³⁸. Those benefits are then translated by the financial community into 'undisclosed intangible' and named 'organisational' or 'relational capital'. To be sure, network externalities occur when the investment supporting the network exhibits return to scale and sunk costs, which benefit to large leading firms through 'natural monopoly rents'. However, neither economies of scale nor lesser barriers to entry are 'natural' characteristics of markets. They are largely based on the deployment of GSCs as a 'strategic and valorisation space' (see first section) in which power relations among actors are critical in building and more important in maintaining those 'natural' characteristics in order to capture rents. There is now an abundant literature pointing to the cumulative and negative effects brought about less by the effects of the singular economic characteristics of network-based and platform industries than by large firms' strategies. One consequences of these strategies are that 'the winner-takes-all'. This pave the way to the constitution of private monopolies, an auto-cumulative process of monopolisation (Barkai, 2016), to the consolidation of rent-generating activities and to the control of market access via the ownership of IA (Baranes, 2018).

7. Conclusion

In recent years, French major TNCs in aeronautics and automotive have been reshaping their GSC. We have identified two major trends: 1) they have been offshoring while refocusing their activities at the upper (design, research and development, branding, Intellectual property) and lower (marketing, maintenance and post-sales services) ends of their GSC. This move was aimed at consolidating their control on the market and at generating rents in high value added activities. The offshoring of their R&D activities has gained momentum although the home country still remained central; 2) the growth of IA in their balance sheet from 2000 onwards has been dramatic. It reflects the central role of IA in corporate competitive dynamics, highly valued by financial markets.

It is obvious that for a 'non-financial' TNC, investing in productive capital and in workforce development is a prerequisite for value creation on which financial appropriation is based. French automotive and aeronautical large companies, since they are manufacturing firms, are undoubtedly producing cars and planes, but they are also acting as financial groups. This does not mean that the top management faces a choice, with *either* productive *or* financial investment. This alternative explanation underlies most of the financialisation literature, which seeks to prove that in contemporary capitalism, productive investments are 'crowded out' by financial ones. Starting from a different theoretical perspective, our analysis is that of a continuous circuit of capital where both productive and financial

³⁸ Id., p. 25.

capital are simultaneously valorised. To support this argument, one has to think that financial assets, while representative of assets engaged in the production process for their owners, spend an autonomous life - and enjoy their own valorisation - on financial markets.

IA, as a class of financial assets, encapsulates this 'duality' of capital. Brands, intellectual property rights, and other drivers of relational power are core components of IA. They allow large TNCs to consolidate their monopolistic position and increase the capture of rents along their GSCs, while the value of their IA inflates on stock markets. A feedback process sets in between the accumulation of monopoly rents on the 'real' side of TNCs' activities and the valuation of their IA on the financial side, based on their expected earnings. This capacity of financial assets to 'pre-empt the future' by claiming a part of the value not yet created, which gained considerable momentum in the three last decades, is a major indicator of the deep embeddedness of the worldview and priorities of finance governing non-financial large corporations.

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