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Pierre-Louis Choquet

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Piercing the corporate veil : towards a better assessment of the position of transnational oil and gas companies in the global carbon budget

Abstract

In recent years, research in climate science has increasingly emphasized the need to reduce fossil fuel supply in order to avoid an overshoot of the global carbon budget, and to meet the Paris Agreement target to keep global warming ‘well below 2°C’. This paper aims to outline a balanced appreciation of the particular responsibility held by transnational oil and gas companies (TOCs) in the global challenge to organize an equitably managed decline in fossil fuel extraction. It does so by focusing on a case study. The latter consists in the stylized reconstruction of the internal social dynamics that shape the power structure of the French firm Total, and in questioning its ability to make investment decisions aligned with the imperative to preserve the stability of the climate system, as its public position makes clear. The persistence of short-termed compensation schemes in the higher corporate hierarchy impede the elaboration and implementation of deep decarbonisation strategies at the firm-level. These would imply a significant upscaling of investments in renewable energy and/or carbon-capture storage technologies, in order to avoid the foreseeable destruction of corporate jobs linked to oil and gas extraction in an increasingly carbon-constrained world.

KEYWORDS: *CLIMATE JUSTICE, SUPPLY SIDE POLICIES, FOSSIL FUELS, CARBON BUDGETS, TRANSNATIONAL CORPORATIONS*

1. Introduction

Anthropogenic global warming constitutes a significant threat to the prosperity of human societies, and to the stability of the interlinked ecosystems in which they are ultimately embedded (IPCC 2014; Steffen et al. 2015; Holy Father Francis 2015). In the wake of the Paris Agreement, the United Nations Framework Convention on Climate Change has committed its parties to implement strong policies so as to “hold the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C” (UNFCCC 2015). It is now admitted that preventing the risk of a dangerous anthropogenic interference in the climate system implies to extract only a limited fraction of the existing reserves of fossil fuels, since the proportionality of cumulative carbon dioxide emissions to warming is now firmly established (Allen et al. 2009). This amounts to say that there is a difference in magnitude between the limited amount of gaseous carbon that the compartments of the Earth system (atmosphere, ocean, land) can respectively

absorb and the vast quantity of solid carbon that is contained in the lithosphere under the form of hydrocarbons. After having warned in 2012 that “no more than one-third of proved reserves of fossil fuels [could] be consumed prior to 2050 if the world [was] to achieve the 2°C goal, unless carbon capture and storage (CCS) technology [was] widely deployed” (IEA 2012:3), the International Energy Agency (IEA) has reiterated its diagnosis more recently, pointing out that there was a “pervasive [...] risk that all existing proved fossil-fuel reserves [would] not be fully utilised, future investment into upstream oil assets [would] be curtailed and the returns of fossil-fuel companies [would] be severely affected” (IEA 2016:112). From the perspective of catastrophic climate change, one of the most pressing challenges thus consists in identifying how this ‘carbon mismatch’ is likely to affect business-as-usual trajectories across the spectrum of the fossil fuel industry. Although the intensity of coal extraction is the most critical variable of this equation, I do not scrutinize it in this article – for most TOCs have now divested from this business. Taking as a starting point the macro-diagnosis established by Heede and Oreskes (2016) about the potential emissions from the expected production of major fossil companies, I aim to refine it further in order to characterize more particularly the specific position of TOCs in the carbon budget nexus. This paper thus addresses the following questions: what type of reserves tend to be in the books of investor-owned TOCs – and to what extent can they be considered ‘critical’, as far as the 2°C goal is concerned? How do patterns of financial wealth distribution throughout Total’s hierarchical structure shape both its internal power system and its wider institutional dynamics? How do these patterns configure in turn the concrete features of activities of extraction, thereby re-assembling collective relationships to hydrocarbon deposits located beneath the Earth’s surface, and accelerating the disruption of the global carbon cycle?

2. Materials and methods

This paper is the first scientific outcome of a wider research project on Total, which I undertook between 2014 and 2017, and in the context of which I conducted several fieldwork sessions in the corporate realm – mainly by organizing ±40 semi-structured interviews with employees and managers. Yet, this research article does not directly build on the qualitative ethnographic material gathered during this research. If I do not engage in a quantitative, systematic analysis of upstream investments across the oil and gas industry, I seek nonetheless to transpose this analytical framework to the firm level, by endorsing a ‘case study approach’ that enables to reconstruct Total’s trajectory. In this endeavor, I harness publicly-available corporate data drawn from documents disclosed for financial regulation authorities (which notably include information on financial compensation packages to senior managers and executive officers between 2000 and 2017), and I interpret them through the lens of the available scientific literature on the oil and gas industry in a variety of fields (economic geography, organization studies, sociology of corporate elites, etc.). I also

highlight how scientific debates surrounding the concept of a global carbon budget matter when it comes to assessing the position of TOCs in a 2°C world.

3. Overall context

3.1. Global carbon budget and fossil fuel reserves

The concept of global carbon budget is often thought of as a smart, simplified metrics that can be harnessed by policy-makers in order to implement measures designed to cut emissions. Back in 2009, one of the first comprehensive studies on carbon budgets established that ensuring a 66% probability to keep global warming below 2°C by 2050 implied to limit cumulative emissions to 1158 GtCO₂ between 2000 and 2050 - knowing that at the time of publication, emissions between 2000 and 2006 had already totalized 234 GtCO₂ (Meinshausen et al. 2009). The quick-paced development of the scientific literature consecrated to carbon budgets soon revealed the complexity of this indicator, as well as its sensitivity to a number of parameters. In 2014, the Intergovernmental Panel on Climate Change (IPCC) evaluated in its fifth assessment report that no more than 400 GtCO₂ could be emitted from 2011 onwards for a 66% chance of avoiding 1.5°C warming (IPCC 2014:69) – of which only 118 GtCO₂ would be remaining from the beginning of 2018, according to estimated 2011-2017 emissions (Hausfather 2018a). More recently, the IPCC significantly revised this estimation, suggesting that 420 GtCO₂ could be emitted from 2018 onwards for a 66% chance of avoiding 1.5°C warming (IPCC 2018:16). This considerable increase in the estimation of the remaining global carbon budget resulted from the correction of a slight mismatch between modelled and recorded historical emissions. Hausfather (2018b) has recently outlined a comprehensive meta-discussion of some of the most recent attempts to assess the remaining global carbon budget, which range from near-to-zero estimates (e.g. Lowe and Bernie 2018; Rogelj et al. 2018) to higher numbers (e.g. 779 GtCO₂ to be emitted from 2018 onwards for a 66% chance of avoiding 1.5°C warming, according to Richardson et al. 2018; 693 GtCO₂ according to Goodwin et al. 2018). Both the significant upward reevaluation of the IPCC ‘standard’ estimate and the persistence of a large interval between minimal and maximal estimates signal how sensitive to parameters the calculation of the global carbon budget remains. This has led some observers to suggest that in these conditions, the idea of a remaining carbon budget could simply not be relevant anymore (Peters 2018): with the rise of global temperature now approaching 1°C, the 1.5°C target becomes so close that infinitesimal differences in sets of initial hypothesis have disproportionate impacts on the resulting carbon budget estimates. In any case, if the current rates of emissions persist (Le Quéré et al. 2018 evaluate anthropogenic emissions to 39 GtCO₂/year for the decade 2008-2017), the global carbon budget associated with a warming well below 2°C would most likely get exhausted in less than 20 years (for the largest estimate) – and in little less than 11 years for the last IPCC assessment (2018).

In 2009, forerunners Meinshausen and co-authors had made clear that achieving the goal of stabilizing global warming below 2°C with a 50% probability implied that "less than half the proven economically recoverable oil, gas and coal reserves [could] still be emitted up to 2050". Global anthropogenic emissions are indeed predominantly generated by fossil fuel combustion (82% of emissions over the last half-century – the remaining 18% being caused by land-use change, Le Quéré et al. 2018). Meinshausen and co-authors derived from the figures of proven fossil fuel reserves¹ an estimation of the emissions that would be released by their combustion, and suggested it amounted to $\pm 2,800$ GtCO₂, with an 80%-uncertainty range of 2,541 to 3,089 GtCO₂. In its fifth assessment report, the IPCC evaluated the potential emissions from known reserves between 3,670 and 7,100 GtCO₂ (IPCC 2014:69). Applying the emission factors proposed by the IPCC for fuel combustion (IPCC 2006) on BP's 2018 reserves assessment suggests that the full production of proved oil, gas, and coal reserves would generate respectively 630, 365, 2,037 GtCO₂ (=3,029 GtCO₂ in total).

Despite the significant methodological complexities associated with the estimation of a global carbon budget, it thus seems that the assessments of potential emissions from hydrocarbon reserves reveal orders of magnitude that confirm the mismatch between the amount of fossil fuels available for extraction and the quantity of carbon that the atmosphere can absorb.

3.2. Investor-owned oil and gas firms: an inconvenient exposure?

After the publication of Meinshausen and co-authors' works in 2009, it appeared necessarily to outline fine-grained descriptions of hydrocarbon reserves, so as to help policy-makers in their effort to organize an equitably-managed phase out from fossil fuel extraction.

In 2011, the Carbon Tracker Initiative (CTI) published a report focusing on the reserves held by the top 100 listed coal and top 100 listed oil and gas companies, in order to warn institutional investors that these assets, totalizing potential emissions of 389 GtCO₂ and 356 GtCO₂ respectively, could become 'stranded' if consistent public policies (e.g. a clear plan of emissions ceiling) were implemented to meet the 2°C target (CTI 2011). A subsequent report refined the diagnosis further, taking into account not only the reserves that were in the books and that would be developed with high certainty (i.e. the perimeter of CTI 2011), but also those that firms would be potentially inclined to bring on stream in the coming years; with such an extended perimeter, the potential emissions reached 640 GtCO₂ for coal and 901 GtCO₂ for oil and gas (CTI 2013), their addition thus surpassing most estimates of the global carbon budget – and this, without even having considered state-owned reserves.

More recently, McGlade and Ekins (2015) have used an integrated-assessment model to determine an economically-optimal regional distribution of unburnable reserves. Their analysis suggests that without massive recourse to CCS, keeping

global temperature below 2°C with a 50% probability entails that respectively 35%, 52%, and 88% of global oil, gas, and coal reserves must be left untapped. The detailed description of how such global targets trickle down onto different geographical areas (depending on the features of their hydrocarbon deposits) is insightful: it suggests indeed that in the 2°C scenario, the open-pit mining of bitumen in Canada "drops to negligible levels after 2020", and that the resources located within the Arctic circle are identified as unburnable. These results corroborate those obtained by previous modelizations (McGlade and Ekins 2014), which had stressed that at least 40-55% of yet to be found deepwater resources (as of 2010) could not be developed in a 2°C world. This clear-cut diagnosis indirectly fragilizes the position of TOCs, which have significantly invested in these technology- and capital-intensive classes of assets since the early 2000s. TOCs often play indeed a key role in unlocking state owned assets that are hard to access for state-owned companies which have poor technological know-how, little access to international capital markets, and endemic corruption problems.

Heede and Oreskes' (2016) most recent study provides another decisive contribution in the effort to delineate the exposure of TOCs to a potential carbon bubble. In a previous work, Heede had demonstrated that 70 companies and 8 government-run industries had produced 63% of the world's fossil fuels from 1750 to 2010 – and that they could hence be considered as indirectly responsible for a large fraction of historical emissions (Heede 2014). On this basis, Heede and Oreskes have sought to estimate the emissions that would be released by the combustion of the 'reported proved recoverable reserves' declared by 42 investor-owned companies, 20 state-owned companies and 8 nation-states with government-run coal industries: these amount to respectively 162, 766 and 676 GtCO₂. On this basis, the authors observe that "there is no question that the majority of reserves of both oil and natural gas are held by state-owned companies", and insist that dangerous global warming "cannot be prevented by focusing on private sector activity alone" (2016: 16). Their estimations suggest that "the use of the existing proved reserves held by the largest investor-owned corporations [did] not lead to climate warming above the 2°C limit" (*ibid.*); however, Heede and Oreskes simultaneously emphasize that "exploration for and development of new reserves – beyond those that [were, in 2016,] presently proved – [would] exceed the carbon budget and push the global climate well past the 2°C limit." (2016: 18)

Even though the previously-mentioned studies offer complementary macro-perspectives that each enable to ascertain the position that TOCs (*qua* asset holders) hold in the global carbon budget nexus, their methodological approach is insufficient. As such, it offers indeed insufficient grip to stress-test the effective carbon exposure of TOCs' project portfolios and industrial strategies (two exceptions are CTI 2014a and CTI 2014b) – whereas it is precisely at the firm-level that companies have developed narratives in order to establish the compatibility between their business

plans (present and future) and the 2°C target. Additional analysis is thus needed to complicate our understanding of the position of TOCs. In the remainder of the paper, I focus on the case of Total, which I take to be somehow illustrative of the rest of the European oil and gas industry. I seek to show that avoiding the false opposites that consist in demonizing, or in exonerating Total implies to 'pierce the corporate veil' and to provide an empirical description of the institutional dynamics that structure its development: this in turn enables to assess more precisely where the firm stands with regard to climate change.

4. Case study

4.1. A glimpse on Total's projected trajectory

As of late 2017, Total counted 98,277 employees throughout 130 countries, produced 2.57 million barrel oil equivalent per day (mboe/d) (Total 2017a), and had the fourth highest market capitalization in the oil and gas industry at around US\$168b (after Shell, Exxon, and Chevron) (Forbes 2018). Ekwurzel et al. (2017) have estimated that between the 1930s and 2010, the historical activities of the company had contributed to emitting ± 11.9 GtCO₂eq – an amount corresponding to $\pm 1.30\%$ of worldwide emissions between 1850 and 2010. Heede et Oreskes (2016) have evaluated that in 2013, Total had ± 4.3 GtCO₂eq of potential emissions 'waiting' in its reserves – an amount corresponding to $\pm 0.42\%$ of the total potential emissions from all investor- and state-owned companies. The fact that Total's potential contribution is relatively modest does not imply that it should escape close scrutiny. As of september 2018, the company reported indeed a projected capital expenditure of US\$15-17b per year in 2019 and 2020, of which more than a half was meant to be allocated to the exploration and production branch: Total could then declare that one of its objectives was to "leverage [its] deepwater expertise" in Africa, Brazil, and in the Gulf of Mexico; of the twelve major start-ups that were then announced for 2019-20 (which should bring on stream ± 0.6 m barrels of oil equivalent per day by late 2020), seven were (ultra-)deepwater projects (Total 2018). The recent acquisition for US\$8.8bn of Anadarko's African offshore assets confirms this strategic orientation (Reuters 2019). Put against the previously-mentioned findings of McGlade and Ekins (2014, 2015) and Heede and Oreskes (2016), it seems reasonable to hypothesize that the development of such assets is at odds with the 2°C target. Taking the 'New Policies Scenarios' (NPS) and 'Sustainable Development Scenarios' (SDS) of the IEA as the building blocks of its climate strategy, the firm anticipates that an investment of "US\$1-2b per year in renewables and power" could put it on track to reach a "possible sales mix 2040" made of natural gas (45-55%), oil (30-40%, including biofuels), and low carbon electricity (15-20%), that would be cogent the 2°C target (Total 2018). However, a recent systematic analysis has highlighted the imprecision with which Total refers to the SDS and the NPS in publicly-available documents, thus signalling a significant ambiguity in its climate strategy (Mougeolle 2019) – and this,

even before considering the fact that the credibility of IEA scenarios has now been increasingly questioned (see Muttit 2018). Total's current sales mix projection thus seems poorly compatible with rapid decarbonization roadmaps, which rely on "societies being able to swiftly replace existing capital with new investments at massive scales" (Millar et al. 2017: 745). Rockström et al. (2017) have thus notably suggested that implementing such a roadmap probably implied that "by 2040, oil [would] be about to exit the global energy mix".

This firm-level analysis suggests a dissonance between Total's industrial strategy for the decades to come (more diversified, but still focused on fossil fuel extraction) and the many-sided diagnosis that is increasingly shared in the scientific community about the necessity to organize a managed phase out from coal, oil, and natural gas.

4.2. Debunking the corporation

In the subsections to come, I seek to demonstrate that it is not possible to understand geographies of oil and gas extraction (i.e. the spatialized practicalities through which carbon is transferred from the lithosphere to the atmosphere) without retracing the flows of money that activate the process of accumulation, thereby giving their orientations to the multifarious dynamics that shape the firm's trajectory. This requires to complicate the commonsense depiction of the firm ('Total') as a unified corporate agent which is spontaneously conveyed by scientists (see Heede 2014, Heede and Oreskes 2016), by civil society and NGOs, and of course by the corporation itself – and to explore a complementary perspective, one that emphasizes the deep-seated antagonisms out of which the corporate realm gets continually re-structured. As such, the firm refers to a social institution channelling the economic activity developed as a consequence of the cluster of contracts that connect corporate assets (i.e. means of productions) to the various holders of resources that are required to operate them (Robé 2011). Far from having aligned interests, these resource holders – be they 'labor investors' (workers), 'capital investors' (shareholders) (Ferrerias 2017) or else (environmental activists who act on behalf of non-humans, civil servants whose activities instantiate the state apparatus, etc.) compete with each other in order to gain a power position on the firm – and hence secure greater control on its conduct (Deakin 2012; Chassagnon and Hollandts 2014). Back in the 1930s, Berle and Means (1991) had observed that a massive disjunction between ownership and control had accompanied the emergence of a 'managerial capitalism' characterized by the predominance of large firms securing oligopolistic positions (for the oil and gas industry, see Mitchell 2013). Chandler (1977) later referred to this reinforced discretionary power of managers by contrasting their "visible hand" with the supposed "invisible hand" of the markets. Today, business firms can still be distinguished from markets in that they represent an "explicit institutionalization of formal hierarchies and authority relations" (Néron 2015). In recent decades, their internal chains of command have reached critical

sizes, crossed over national borders, to the point that intra-firm relations now account for a substantial share of world trade (Lanz and Miroudot 2011; Baldwin 2012) – thus reshaping the world-power system (Robé et al. 2016). In the case of Total, intra-firm cooperation has materialized in the form of a pyramidal organization composed of distinct business units, each with its own hierarchical structure and operating beneath a centralized holding (Serfati 2008): in the oil and gas industry, being able to coordinate a large number of actors (both inside and outside the firm) has indeed become a prerequisite for majors willing to develop complex resources (Beyazay 2015; Bridge 2008; Bridge and Billon 2017). In this perspective, TOCs can thus be interpreted as the core ‘hubs’ of the accumulation process: this, however, does not entail that they are homogeneous, uniform entities. Rather, a rigorous description of the social interactions that underlie this intra-firm cooperation has to emphasize how their inherent conflictuality is checked so as to ensure the continuity of the business-as-usual. The operator of this containment is corporate power.

4.3. Corporate power in the French context

In this section, I offer a more nuanced view of corporate agency by contesting its homogeneity; to do this, I need to analyse more precisely the power relations that frame and channel the process of accumulation in the corporate realm. In this endeavour, I highlight the intra-firm social dynamics that structure the organization, and I suggest that the patterns and compromises arising from their mutual containment strongly configure Total’s trajectory. So far, I have considered the firm a self-standing entity. The main interest of this section therefore consists of unpacking it, with a view to demonstrating how, by enabling the deployment of the business-as-usual, the heterogeneous tensions that cross Total are simultaneously vectors of global environmental change. To do this, I demonstrate that the exercise of corporate power remains significantly codified by French elite culture; then, I describe the profit-sharing dynamics that contribute to shaping Total’s growth trajectory from within, and suggest that these mediate specific relationships with the natural environment.

4.3.1. Socio-cultural determinants

In this subsection, I argue that describing how corporate power is exerted at Total needs to acknowledge the influence of the firm’s French heritage. This suggests that Total’s progressive integration into international markets, predicated on its ability to attract foreign capital and to amend its governance to fit the Anglo-American paradigm of shareholder value, fell short of a complete dissolution of its cultural identity. My claim therefore resonates with Clark’ and Wójcik’s (2007) analysis of the German model of capitalism. If Total’s recent strategic reorganizations show clear signs of a convergence with the Anglo-American model (see next subsection), some decisive elements betray the pervasive continuity of a specifically French form of capitalism. Among these, the singular status of the corporate elite is a case in point:

the way top managers exert their power in the firm (in order to ensure the continuation of business-as-usual activities) remains largely tributary to the national context. As of 2015, 92.7% of Total's executive officers (12 people), and 72.1% of its senior managers (about 290 people) were indeed French, though the figure was much lower for managers and the workforce as a whole, at 30.1% (about 27,600 people) and 31.2% respectively (Total 2016).

French business elites are a relatively unified group with access to dense, cohesive networks that create substantial social endogamy. Until the 2000s, a degree from one of the highly-ranked *grandes écoles* would automatically pave the way to a successful career (Dudouet and Joly 2010; Maclean et al. 2014). As Kocher-Marboeuf (2003) and Yates (2009; 2010) have demonstrated, the French oil industry has been a *cas d'école* of such an interlocking between corporate elite circles and the French higher state apparatus: four of the seven CEOs of Total over the last 60 years have thus graduated from 'Polytechnique, Corps des mines' – and if the nomination of the penultimate one (De Margerie) caused a sensation (he had a business school background), the arrival of his successor (Pouyanné) was a return to normal. In a recent study on French business elites, Maclean and Harvey (2014) have argued that reconnecting “class analysis with organizational analysis” was key to understanding how the ‘field of power’ (a concept they borrow to Bourdieu) was getting constituted in the top management of the French firms listed in the CAC40 stock index. Building on an econometric approach, Maclean and Harvey isolate the major significance of a “social class effect” in the selection process through which “hyper-agents” come to occupy the highest positions in the French corporate field of power. This result indicates a significant social endogamy in the nomination of senior managers. The latter therefore constitute a dominant group in the firm, a group that secures its status through the perpetuation of “hierarchy-enhancing legitimizing myths” (Pratto et al. 2006) that are deeply entrenched in the corporate imaginary. Although Maclean and Harvey conducted their study recently, its conclusions seem to reflect long-standing sociological traits of French corporate elites first described by Boltanski (1987). Analysing the quick-paced penetration of the French stock market by foreign capital in the 1990s, Goyer (2006) had earlier hypothesized that the remarkable ability of large French firms to attract capital from non-EU investors was notably due to their organizational design, which left room for assertive CEOs and top managers to reorganize the workplace in a unilateral fashion: non-European mutual and hedge funds particularly appreciated this characteristic because the top-down decision-making processes of French multinational firms was a good match with their time horizon (Baudru et al. 2001). The influx of foreign capital did not fundamentally challenge the concrete arrangements of the exercise of power in the largest French firms (François et al. 2016): non-EU investors rather identified the management-led corporate decision-making process as a ‘comparative advantage’ of French listed corporations, and implicitly contributed to its perpetuation by

demanding high financial returns. The implementation of cash-flow discipline naturally accentuated the concentration of decision-making power in the hands of the CEO and financial managers by ruling out other performance indicators.

In an important work on the cultural values underpinning French corporate codes, d'Iribarne has demonstrated that French 'cadres' exhibit a "defensive concern" for rank and distinction, as well as a taste for privileges directly inherited from the *ancien régime*. The persistence of aristocratic values beneath a meritocratic gloss explains why it becomes possible to classify French employees into different castes inside the same firm. A "logic of honor" binds every group to specific duties and privileges, which are partly ingrained in salary scales and career paths (d'Iribarne 1992, 1994). This description resonates with Goyer's (2006) suggestion that, compared with what can be observed in Germany, "the promotion system of French firms [reflects] a change of status unilaterally decided by the top management rather than the acquisition of technical expertise." Of course, the "change of status" invoked in his account is not purely arbitrary, for it recognizes good performance: however, it nonetheless suggests that co-optation remains more than elsewhere the norm. According to Clift (2012), the longstanding French hostility to liberalism as an intellectual tradition can explain this non-liberal penchant inherent in French corporate governance, which one could even interpret as a Rousseauian heritage; rank-and-file employees and intermediary managers are thus often inclined to welcome the decisions of executive officers as the instantiations of a substantial 'corporate will' that leaves little room for dissent. In this vein, it is interesting to report how portraits of Total's CEO in the French press regularly praise his "iron will" and "unilateral style of management" (*Le Monde* 2016) – and only rarely raise the side-effects of such a complete supremacy on corporate governance or on investor relations (*Les Echos* 2018).

The French corporate elite's latent socio-cultural traits influence the exercise of corporate power and, therefore, the organization of the accumulation process. In this perspective, power relations are best interpreted as being fundamentally "embedded in distinctive social contexts" (Clift 2012), which are in turn deeply culturally-informed – thereby articulating a distinctively French variety of capitalism. Yet, emphasizing this explanatory pattern does not rule out others: as Goyer (2006) observed, different patterns may even become closely intertwined (i.e. the socio-cultural and the economic one). In the next subsection, I supplement the present description with a further analysis of how Total's transition to shareholder capitalism has accelerated a decoupling of the interests of employees along the hierarchical chain.

4.4. Economic determinants

In this subsection, I consider four distinct schematic social groups inside the firm, on the basis of the company's three-fold classification (Total 2016), which encompasses 'executive officers', 'senior managers', and 'other employees' (who actually are the

‘other employees’ *who benefit from performance shares*): the ‘other employees’ who do not benefit from this incentivization scheme thus constitute the last category. I suggest that the differentiated dynamics of these intra-firm groups are best analysed by considering their respective positions towards what I refer to as the ‘fossil rent’, namely the broad array of social goods that are traditionally associated with the production of hydrocarbons: if financial wealth is the most obvious good, social status and prestige also matter. Influenced by Walzer’s (1984) critique of monist approaches to distributive justice, this definition of a multi-faceted ‘fossil rent’ thus seeks to rule out the temptation to provide one-sided mechanistic accounts of human motivations. For example, higher executives of oil and gas majors tend to cooperate actively with their national embassies more than in any other industry, and thus tend to develop ‘privileged’ relationships with foreign ministers and heads of states (Auzanneau 2015; Cantoni 2017). This bestows a certain grandeur on their position – a grandeur that is incidentally reinforced by a myriad of other factors. Kocyba’s (2017) description of how the architecture of the European Central Bank tower in Frankfurt mirrors the power relations between EU members could thus be transposed to Total: in the skyscraper of the company’s headquarters, which piles up on the surface the fossil wealth excavated from the depth (Bridge 2015), the panoramic, top-down view on Paris that higher executives enjoy from their offices doubtlessly bolsters their sense that their mission – supplying its “lifeblood” to the *polis* (Huber 2009) – gives them status. For the remainder of this subsection, I do not analyse further the symbolic goods that are attached to the exercise of power, and I focus exclusively on the financial wealth that the fossil rent generates.

4.4.1. *Financialization, wage inequalities and innovation*

Since it would exceed the scope of this analysis to embark on an exhaustive study of the intricate links between financialization, wage inequalities, and innovation, I first isolate some of the key arguments that have structured discussions around the Anglo-American context, before turning to the French case.

Since the mid-1980s, many observers have stressed how the diffusion of the shareholder value paradigm in the USA had served to justify the rise of executive pay, and the corresponding widening of income and wealth inequalities. Lazonick (2012) and Lin and Tomaskovic-Devey (2013) have extensively analysed the impact of this transformation on large American firms: the increasing share of executives’ earnings realized through financial channels, supported by the emergence of new practices on the stock markets (‘downsize and distribute’ rather than ‘retain and reinvest’) progressively led to a reshuffling of the class alliances that had stabilized after the New Deal. Duménil and Lévy (2015a, 2015b) have described this shift as a transition towards ‘managerialism’ – that is, a late phase of capitalism in which the interests of managers and capitalists have become virtually indistinguishable, with the labour’s share of income entering a steady decrease. It is worth mentioning here

that these accounts are based on datasets aggregated at the national level; they do not assess distributive issues within the corporate perimeter. Mueller and co-authors (2016) partially filled this gap by developing a structural analysis of intra-firm income inequalities beyond the mere focus on executive pay, which had generated the bulk of academic debates. Analysing a sample of British firms and subdividing their hierarchies into nine generic socio-professional layers, the authors were able to demonstrate a positive correlation between the size of the firm and pay inequality across the hierarchy. Their finding supports the preceding analysis and confirms the hypothesis of an upsurge in intra-firm income inequality in recent decades, at least in Anglo-American firms. I should also mention, albeit briefly, the effects of financialization on innovation. Graeber (2015) has rather scathingly pointed out that financialization had, at least since the 1960s, been exacerbating a deep-seated feature of mass-market capitalism, namely its structural inability to deliver substantial technological progress – an observation that Veblen (2012 [1921]) had made earlier. The growing obsession of multinational firms with the value of their stocks has had adverse effects on capital expenditure (e.g. by justifying expensive buyback plans: see Serfati 2008), thus impeding the integration of ecological constraints in the business-as-usual (Fieldman 2014). Total is not an exception in this respect: it is reasonable to contend that its full integration to the circuits of the financial economy structurally hinders long-term research and development projects, thereby affecting its organizational capacity to engage a 'phase out' strategy.

Even if primary data on the level of intra-firm income inequalities within French transnational firms are largely unavailable, this hypothesis of a tight connection between pay inequality and latent dynamics of financialization can be defended. In 2011, Faber (the then VP and now CEO at Danone) estimated, on the basis of non-disclosed corporate figures, that a 30% reduction in the global compensation allocated to the top 1% of Danone's best-paid employees would, if redistributed to the lowest 20%, double their pay. This order of magnitude clearly hints at a pervasive structural gap in the wage policies of French champions, which it is possible to ascertain indirectly. Building on datasets aggregated at the national level, Piketty (2014) noticed that the fraction of the French national income going to the top 0.1% jumped from 1.5% in the 1980s to nearly 2.5% in 2010. Earlier work by Landais (2007) showed a similar picture when he established that the average incomes of the top 1%, 0.1% and 0.01% grew by 14%, 29% and 51% respectively between 1998 and 2005. By highlighting the crucial role of the financial sector in widening the income gap nationally, Godechot's (2011) analysis provided a more comprehensive view of this diagnosis: in 2007, 24.1% of the upper 0.1% wage fractile worked in the financial sector, but just 6% 30 years earlier; in the industrial sector, the figures were 14% and 38% respectively. Yet, Alvarez's (2015) analysis of a sample of 6,980 non-financial French firms reveals that an increased dependence on profits accrued through financial channels tends to decrease labour's share significantly, thereby

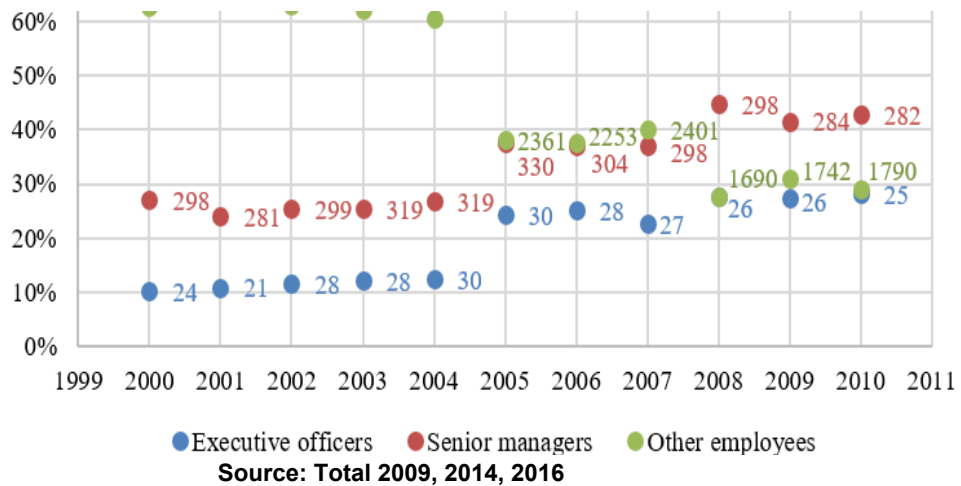
contributing to a widening of inequalities. Cross-checked with Labban’s (2010) account of the rapid financialization of international oil markets since the 1980s (i.e. of the growing decoupling between the circulation of ‘paper oil’ in financial markets and the effective trade in physical markets) and the active involvement of oil and gas firms in this process, Alvarez’s diagnosis that a “strong incentive for corporations to move investments from real assets to financial assets” exacerbates pay inequality (and low innovation) can probably be extended to Total, a hypothesis I shall test further in the next subsection.

4.4.2. Intra-firm class dynamics as a vector of environmental change

In this paragraph, I examine Total’s internal power structures with a view to showing that their continuous reconfiguration (articulated, in recent decades, by the imperative to align with the interests of shareholders) is intimately interconnected with the articulation of specific ‘ecological regimes’. I suggest that only a close study of the dynamics inherent in the process of accumulation can link the social practices enacted everyday by corporate managers at Total’s headquarters in Paris, on the one hand, with the degradation of socio-ecological habitats in sites of extraction, and with the diffracted release of CO₂ in a globally-homogenized atmosphere, on the other. In other words, understanding the concrete arrangements of accumulation enables one to interpret these empirical phenomena not only as “ontologically distinct fragments of reality”, but also as “parts of an internally related totality” (Arboleda 2015).

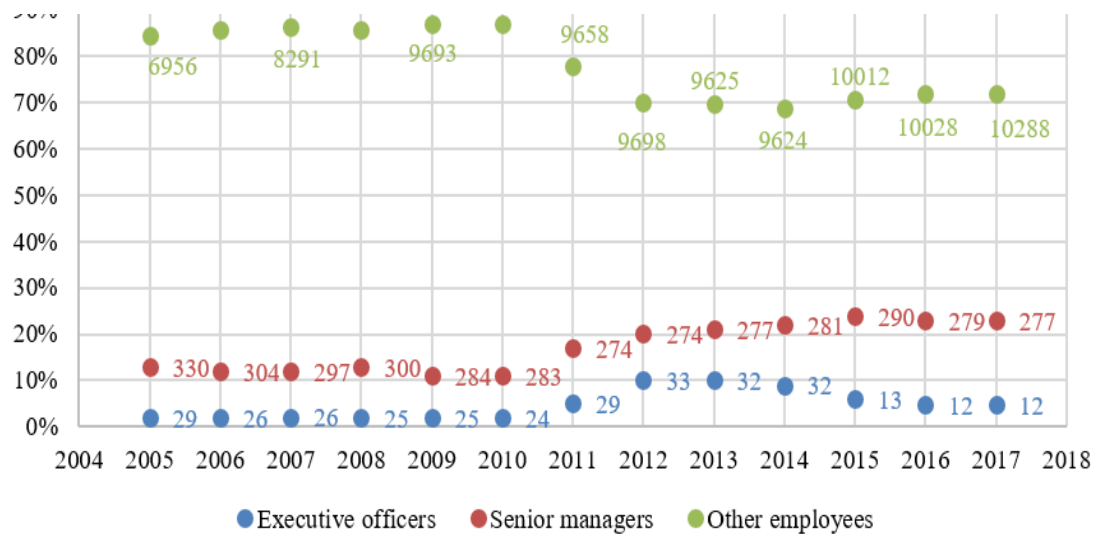
When introducing the concept of ‘fossil rent’ earlier in the discussion, I implicitly hinted at its uneven economic distribution along the hierarchical chain of command. Now I shall focus more deliberately on its financial component and analyse how Total’s executive officers and senior managers (who constitute about 0.3% of the corporate workforce) manage to harvest a substantial share of it. Analysing the distribution of stock options and performance shares over the last 15 years helps one to appreciate this phenomenon better. The breakdown of Total’s stock option grants (Figure 1) reveals how executive officers and senior managers gradually captured a greater share of the total options distributed, from approximately 30–35% in the early 2000s to about 70% between 2007 and 2010, while their proportion among beneficiaries only rose slightly (from 11.7% in 2000 to 17.1% in 2010).

Figure 1
Breakdown of Total stock option grants
by category of beneficiary (2000-2010)
(aggregate % of options distributed to each category)



In 2000, the 24 executive officers, on average, received 4.6 times as many stock options as the 298 senior managers, who themselves received 4 times as many options as the 2,740 ‘other employees’ (who were in turn granted an average of 554 options). In 2010, these figures rose significantly, reaching 9.3 and 7.4 respectively, with a rising average of 778 options granted to ‘other employees’. While the suspension of stock option plans after 2010 partially reined in this progression of intra-firm income inequalities, the phenomenon persisted through other channels. One can observe a similar divergence between ‘interclass’ multiplying factors when considering Total’s distribution of performance share grants between 2005 and 2017 (Figure 2). When the firm buys these shares back from the market, it usually grants them to their beneficiaries after a vesting period of two or three years, provided that some performance targets (which the consolidated return on equity mostly defines) are met. On this precise point, it is worth emphasizing that with US\$5b budgeted for the period 2018-2020, Total’s projected share buyback plan beats investments in renewables on the same period (Total 2018).

Figure 2
Breakdown of Total performance share grants
by category of beneficiary (2005-2017)
(aggregate % of shares distributed to each category)



While analysing the data, first it is important to bear in mind that, between 2005 and 2010, a fraction of the top management combined variable revenues from both stock options and performance shares, though the latter were distributed to a larger number of employees. Moreover, the end of the stock option plans coincided with a substantial increase in the total proportion of performance shares allocated to executive officers and senior managers (13% in 2009; 30% in 2017). Throughout the period under consideration, a divergence in multiplying factors similar to the one observed for stock options could be noted: in 2005, the 29 executive officers received, on average, 3.5 times as many shares as the 330 senior managers, who themselves received 2.1 times as many as the 6,956 ‘other employees’ (who in turn were granted an average of 260 shares), whereas in 2017, these factors amounted to 4.7 and 11.9 respectively, with a rising average of 398 shares granted to ‘other employees’³. It is crucial, however, to remember that about 90% of Total’s workforce remains excluded from this compensation scheme – a figure that exceeded 95% for stock options.

Taken as such, these results mitigate Wright’s famous observation that in contemporary capitalism, top executives and managers of multinational firms occupy “contradictory locations within exploitation relations” (Wright 1985:87): in Total’s case, their interests indeed seem significantly aligned with those of shareholders (Duménil and Lévy 2015b). Wright (2015:136–7) himself recently emphasized that a significant part of senior managers’ earnings

“should [now] be thought of as an allocation by the executives themselves of profits of the firm to the personal accounts of managers, rather than a wage in the ordinary sense. They exercise their capitalist-derived power within the class relations of the firm to appropriate part of the corporation’s profits for their personal accounts.”

From all this, it becomes apparent that, far from being a homogeneous institution, Total is composed of distinct social groups (or ‘intra-firm classes’), whose interests are decoupled – if not plainly antagonistic. In the following paragraph, I elaborate

this hypothesis further by exploring the ‘ecological negative’ of this alignment of the interests of Total’s executive managers with their shareholders’ short time horizons.

Recent scholarship in geography has underlined how finance capital, through its fundamental orientation towards the projection of future value creation (Harvey 2007; Labban 2010) ultimately relies on real production to generate profits. As such, it is deeply entangled in the socio-material world. In this respect, Total’s case is not an exception: one can transpose Labban’s (2014) account of how the oil and gas majors’ endorsement of cash-flow discipline has fostered a degradation of working conditions to analyse how its implementation at Total results in a deterioration of the natural environment.

To highlight this phenomenon, I first need to emphasize how crucial the exercise of ‘reserve replacement’ has become for public-listed oil and gas firms. Since the value of their stocks mirrors “the value of current reservoirs [as] future cash potential” (Wood 2016), majors constantly have to prove their reserves by “formatting them into the financial frames of net present value and discounted cash-flows”: “finance [thus] shapes discoveries and formats them into the framework of finance” (Wood 2016). The attempt to keep their stocks afloat in the context of the increasing scarcity of conventional fuels, has, in the last decade, understandably led oil and gas senior executives to turn to unconventional and extreme fuels to compensate the declining reserves. Focusing on the development of Alberta tar sands, Zalik (2015) has showed how these assets “operate[d] as a spatiotemporal fix for capital at various scales, allowing accumulated capital to be sunk into extractive landscapes and financial futures”: replacing reserves is indeed an attempt to appease investors, who expect a return on equity, while ensuring the short-term stability of the top executives’ financial packages. Operating unconventional and extreme reserves (such as those listed as ‘unburnable’ by McGlade and Ekins) thus resonates with the monetary interests of high-profile managers.

The next step therefore is to retrace how these interests structure the organization of the hierarchical chain of command, which in turn strongly shapes the myriad of everyday practices that frame the production of oil in sites of extraction. Wood (2016) has provided a detailed account of how the ‘bottom line imperative’ shapes the working activities of corporate geoscientists. In her ethnographic study conducted in Alberta, she describes how these perform a “financialized geology” when they “surf deep time-spaces and interpret the signals from rock using scalar instruments to map zones of opportunity that are read through the lens of finance”. Far from representing an already existing value, reserve reports thus “spatialize and assign value on the basis of a well’s rate of cash flow”; it is thus possible to conclude that, through mathematical formulas that “provide a means to liquidate the future in the present while creating a financial path dependence on future production, [...] regimes of reserve qualification perform a form of resource management” (Wood 2016). From

this perspective, the identification of Alberta tar sands as a locus for capital accumulation appears eminently context-dependent; this is because it relies on the prior diffusion, in the corporate realm and beyond, of a homogenized language in which this identification can ‘make sense’, thereby transforming deposits into business opportunities.⁴ As Zalik’s contribution suggests, over the last few decades, there has been an increasing tendency to articulate technical-economic possibilities through the imaginary of finance (see also Labban 2010): top executives have become the ambassadors of this new imaginary, and have had their zeal fuelled by structures of incentivization that they have themselves contributed to shape (Caldecott and Rook 2015). Far from occurring on a purely ideational level, this re-articulation of the scope of possibilities has had tangible effects – notably by inducing the development of industrial megaprojects, which organize massive material and energy flows across highly-fragmented production networks – thereby redrawing collective relationships to the natural environment on both a local and global scale.⁵ From all this, it seems clear that in pursuing their interests, Total’s top executives transform the environment mediately by steering the firm towards carbon-intensive futures that meet short-term ROE targets. Yet, it is now probable that in the foreseeable future “stranded assets” (Caldecott et al. 2013) could affect the interests of shareholders and, as a consequence, of financially-incentivized managers. However, the majority of Total’s other employees would probably be better off if the company decided to sell “stranded assets” in order to reinvest in an alternative corporate project – for most of them derive the bulk of their income from a wage (paid in exchange for their work) rather than from financial compensation, and may therefore develop much weaker preferences for the present than do their top executives.

The interests of the different social groups making up the firm are thus decoupled, and their potential antagonism seems largely predicated on the critical temporality of the ‘fossil rent’. Van de Graaf and Verbruggen (2015) have observed that, with the prospect of a structural decline in the demand for oil, “petroleum in the ground [could indeed] no longer be considered as the equivalent of a safe financial deposit”. If the anticipation of this temporal dilemma has already been identified in the strategies of national producers (Fattouh et al. 2016), one can reasonably assume that oil and gas executives are engaged in a similar effort to prolong the availability of the fossil rent, for the latter ensures them a safe haven for the remainder of their career (see also The Guardian 2017a, 2017b). Consequently, one can probably extend Tvinnereim’ and Ivarsflaten’s (2016) finding that Norwegian people “employed in fossil fuel extraction are as favorably inclined to energy-related mitigation as everybody else as long as alternative areas in which to gainfully employ their skills can be found” to Total’s top executives: considering their poor prospect of finding compensation outside the oil and gas industry to match what they currently receive at Total, it is reasonable to infer that they will stick to rent-seeking strategies.

5. Conclusion

In this study, I have attempted to ascertain the position of TOCs in the global carbon cycle, in a time of mounting concern about the potentially disastrous consequences of anthropogenic global warming. After having delineated the contours of the carbon budget conundrum, I have attempted to outline a fair picture of Total's trajectory, and contended that in a context of intensified financialization, intra-firm pay inequality constituted one of the major (yet often overlooked) structural limitations to an ambitious 'phase out' industrial strategy. In a context where it seems increasingly clear that organizing an "equitably managed decline in fossil fuel extraction" would inevitably entail a "significant transitional disruption" of the business-as-usual (Healy and Barry 2017; Kartha et al. 2018; Le Billon and Kristoffersen 2019), it is reasonable to doubt the institutional capacity of TOCs to catalyse such a social, political, and cultural metamorphosis.

Before concluding, it is important to recall how fragmentary the perimeter of this analysis remains: other case studies would be needed to engage in a comparative approach – yet, publicly-available data on TOCs remain unfortunately scarce. However, further research could be undertaken in order to refine further our understanding of how private actors of the economic and financial system accelerate the advent of the Anthropocene. As Galaz has recently emphasized in two co-authored publications (2018), examining the role of finance is crucial – for it intervenes at every step in processes of resources extraction. This requires not only to analyse how asset owners engage with climate risk in a context where passive index funds have gained unprecedented influence (Haberly and Wójcik 2017), but also to pay greater attention to investment banks, which tend to underwrite debt and equity for their clients without considering the environmental risks associated with their projects (Wójcik and Urban, Forthcoming). A raising public awareness on this issue might accelerate the 'end of innocence' for the financial sector, and amplify further the pressure put on the fossil fuel industry.

Endnotes

1. 'Reserves' designate the fraction of fossil fuel resources that is economically and technically recoverable at a given time: as such, their amount is not fixed (and hence, not 'natural'), but rather shaped by external institutional conditions, which ultimately decide the type of geological potentialities that can be assigned value and transformed into financial assets.

2. Between 2006 and 2008, the acquisition rate was equal to zero if the average return on equity (ROE) was inferior to 10%; the firm would distribute all shares with an average ROE greater than or equal to 30%. In 2015, these thresholds were modified (6.5%; 14.5%), and peer performance metrics were introduced (on levels of adjusted net income). Performance criteria are therefore constantly fine-tuned, so that they appear sufficiently 'disciplining' to shareholders, while remaining attainable for

managers. As of 2017, the CSR component of the CEO's variable compensation amounted to 5.5% – the figure reaching 8.3% for other executive officers (Total 2017b:141; 150).

3. Throughout the last decade, Total's stock price oscillated at around €40.

4. Although these analyses on the dynamics of reserve replacement and extension do not directly derive from an observation of Total's specific corporate context, they describe patterns that are industry-wide – and that keep a significant explanatory power when it comes to give account of the French firm's corporate culture. For a very long time, successful careers paths at Total have been predicated on an early socialisation in the prestigious exploration-production branch, which was decisive to the group identity. As of today, this branch continues to organise the systematic transmission of skills and techniques that enable to 'translate' the crude contained in geological reservoirs into actual financial wealth, and there is little evidence that its cultural preeminence over other branches has been challenged so far. In comparison, Total's organizational chart suggests that climate-related expertise remains marginalised at the boardroom level: developed by a small task force that is attached to the corporate holding and to the CEO (Total 2019: 28-29), it remains exogenous to traditional career paths, thus being largely unable to impulse transformative socio-material practices.

5. Studying publicly-traded oil and gas firms, Gagnon et al. (2009) have estimated that the average EROI (energy return on investment) at the wellhead had dropped significantly between 1992 and 2006: while producing one barrel of oil mobilized on average about 0.038 of a barrel during the process of production, fourteen years later this figure had climbed to approximately 0.055 (the EROI had thus decreased from about 26:1 to about 18:1). Hall et al. (2014) stress that the decline in EROI among major fossil fuel producers signals that an increasing proportion of energy output is being diverted to attain the energy needed to operate new resources: a correlate of this phenomenon is therefore that fossil fuels have a growing carbon footprint. This overall decline of the average EROI suggests that oil and gas firms implicitly 'count' on the atmosphere and oceans to absorb the growing CO₂ emissions generated not only by their processes of production but also by the combustion of their final products.

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