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Protection of natural and social resources. A political economy approach

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Abstract

This paper studies the set-up (following a voting process) of institutional arrangements related to the protection of natural and social resources in a context of inequalities and environmental challenges. To analyze how institutional and legislative protection arises, three socioeconomic groups are considered: the educated bourgeoisie, the working classes and the financial elite. Groups are differentiated according to the following divides. Individuals belonging to the financial elite only rely on capital incomes: they invest on firms running either polluting or non-polluting activities. Individuals belonging to the first two groups are differentiated on the following levels: the demand for redistribution (from the working class) and the claims for environment-friendly legislation in relation with clean transport means (by the educated bourgeoisie). We study the institutional framework chosen by individuals under different assumptions concerning the political vote: disjoint majority versus coalition voting. The main result is that -in reaction to the financial elite being the unique winner of the disjoint majority vote- a people's green coalition can emerge, whose redistributive and green choices run against the preferences of the financial elite. This leads to the "greening" of the financial elite, which in turn isolates the working classes in the political arena.

Keywords: Institutions, political choice, redistribution, green legislation

JEL codes: P48, P16, P51, Q59

1 Introduction

Natural and social resources are, together with physical and human capital, fundamental assets for the efficiency and long-term sustainability of our economic systems. There is a rich literature in economics (Nordhaus, 2018 [27]) as well as in political economy (Elkjaer-Iversen, 2020 [18] as well as Amable-Palombarini, 2017 [8]) that extensively deals with issues of social cohesion and social protection and thus testifies to the importance attached to the preservation of societal resources. As for environmental concerns, a growing body of literature in political economy adresses the challenges posed by climate warning and natural resources overexploitation (Chomsky-Pollin, 2020 [14] as well as the ongoing special issue by Cahen-Fourot *et al.*, 2021 [13]) although these concerns have not always been placed at the forefront of debates in this disciplinary field (see Amable *et al.* 2019 [9]).

However, the debate on these topics is intense when we look at interdisciplinary research, at the crossroad between natural and social sciences. Although it is not the purpose of this paper to give an exhaustive account of this debate, we will establish the main issues. While a number of researchers underline the need to rethink our growth and development models in a direction more compatible with the preservation of natural resources (Nordhaus, 2018 [27]), opinions actually diverge as to which solutions should be favoured: a gradual transition to "green growth", a switch to a "degrowth trajectory", or the adoption of ambitious plans such as "Green New Deal". Indeed, these three alternative scenarios are discussed, for example, in the contribution by O'Neill

(2020) [28] which is based in particular on results drown from the new EUROGREEN macro-simulation model developed by D'Alessandro *et al.* (2020) [17]. According to these analyses, some scepticism exists as to the possibility of conceiving a green growth trajectory that brings along both environmental cleanup (Hickell-Kallis, 2020 [20]) and greater social justice (O'Neill, 2020 [28]).

Concerns about the social impact of "Green Growth" can be linked to the economic literature on unequal growth and biased technological progress (see Acemoglu, 2002 [1]; Acemoglu, 2007 [2]; Acemoglu, 2015 [3]; Acemoglu *et al.*, 2012 [4]). In these contributions, Acemoglu develops his theory of biased endogenous technological change. This bias is brought about by firms R&D activity, which is oriented according to markets and price effects: if the former dominates, R&D will be directed towards the more abundant production factor. Applying this framework to inequalities leads to the idea that the evolution of techniques is biased in favour of skilled labour: despite increasing skilled labour supply, directed productivity gains yield a stable or even a widening skill premium over time. Innovations and recent transformations at company level (such as digitalisation, robotisation, artificial intelligence, Big Data) can be seen as results of a sort of biased technological progress. Interesting enough, these transformations are also core processes on the path to ecological transition. Hence, one might raise concerns as to the fact that unequal growth could indeed be a part of the "Green Growth" scenario.

In the papers cited above (cf. O'Neill (2020) [28] and D'Alessandro *et al.* (2020) [17]), the authors consider that achieving the aim of social cohesion leads to selecting degrowth as an alternative to our productivist model of development, in particular because of the

place given to wealth and financial assets taxation in the "Degrowth scenario"; however, this alternative is not free of flaws, among other things, because of tight economic constraints such as a strong expected decrease in private consumption. Finally, the "Green New Deal" scenario is put forward by these authors as a compromise combining the benefits of green growth with a programmatic ambition to fight against economic and social inequalities (O'Neill, 2020 [28]).

We can gather from these arguments that natural and social resources protection is a key issue in front of challenges raised by both environmental degradation and economic inequalities (cf. Klein, 2021 [21]). Environment, cohesion and justice can be seen as facets of a same challenge, which consists in creating, within our mature and ageing societies, new shared and common features overcoming the borders separating socio-economic groups: the notion of common goods can be useful in clarifying this idea. Indeed, the emergence of new shared concepts of "commons" (e.g. linked to the green economy) can be associated with the redefinition of class boundaries: classes ought to be (re)defined on the ground of specific resources that members agree to share and protect: environment and/or cohesion. Indeed, at the same time, as a result of environmental and societal tensions we are witnessing the emergence of "open communities" (Laval, 2016 [25]) aiming to protect sensitive resources: these communities give rise to new alliances between pre-existing socio-economic groups.

An important debate in political economy focuses on the key question to know whether the redefinition of borders across social groups can take place within traditional democratic systems or only through a subversion of them (see respectively Iversen-

Soskice, 2019 [23] and Vahabi-Batifoulier-Da Silva, 2020 [35]). In other words, which are the institutional arrangements most likely to foster the emergence of economic systems based on convenient protection of sensitive resources? A change in the "rules of the game" (e.g. in the institutional framework) seems necessary. In some cases, this change may be brought about as a consequence of electoral decisions as argued by Iversen-Soskice (2019) [23]. In other cases, socio-economic groups put aside as a result of new political coalitions may be led to adopt more radical de-institutionalisation strategies (e.g. riots and revolutions), as suggested in works by Vahabi, Batifoulier and Da Silva (2020 [35]). This is followed by a process of re-institutionalisation which corresponds to the setting up of new institutional devices.

Institutional change is the key process leading to transformation of the "rules of the game" (Hall-Thelen, 2009 [19] ; Bellal, 2019 [11]) and, according to the authors of the French Regulation school (Boyer, 2015 [12]), this transformation occurs endogenously leading to the necessary renewal of the institutional framework, which allows the capitalist systems to endure (Iversen-Soskice, 2019 [23]).

In this article, we will focus on those aspects of the institutional framework that are relevant to the protection of natural and societal resources (concerning the latter think about social cohesion through redistribution for instance): environmental protection legislation implementing taxes and/or subsidies on polluting vs. non-polluting activities; as well as legislation protecting capital investments in company shares which, in our view, yields important redistributive consequences as this protection may encompass securing assets against increases in the burden of legal taxes. Yet, nowadays coordinated capital

taxation is seen as key contribution to the financing of redistributive policies (see Piketty, 2019 [32]). Indeed, we consider in this paper that the two dimensions (environment and redistribution) are entangled which leads us to analyze the building of institutional arrangements as a fundamentally multidimensional problem (Iversen-Goplerud, 2018 [22]).

In this contribution, we will address the question of institutional change and adopt an approach which is compatible with the perspective advocated by authors such as Iversen and Soskice (2006 [24]) as well as Amable and Palombarini (2009 [7]): in line with our previous works (Amable-Gatti, 2005 [6]), in the paper individual actors are placed at heart of the process leading to the transformation of the "rules of the game" that they strive to shape in relation to their political strategies and their economic interests. In this respect, feedbacks exist which, following changes in the rules of the game, yields pressures on actors economic and/or political preferences: we consider this possibility in our analysis of the "greening" of financial elites, which should be linked to the rise of green finance (see Crifo-Durand-Gond, 2020 [16]).

The paper is organised as follows. In Section 2, we introduce the main features of our model: issues related to natural and social resources, the specifications of firms behaviour, the policy preferences associated with socio-economic groups. In Section 3, we study the results in terms of institutional framework chosen by actors under different hypotheses concerning the political ballot: we start by considering a majority ballot with disjointed voting on two key institutional dimensions (e.g. environmental protection legislation and capital protection legislation); then, we study the rise of a two parties

coalition and we show that this will take the specific form of a "people's green coalition" (as observed for instance in Germany) and we study its characteristics. In Section 4, we consider the scenario of greening political preferences of the financial elite, leading to the emergence of a political bloc isolating the working classes - which may push them towards more radical forms of political struggle. A final section concludes the paper.

2 The model

The analysis presented in this section is inspired by the analytical framework initially proposed by Pagano and Volpin in a series of contributions (Pagano-Volpin, 2000 [29], Pagano-Volpin, 2001 [30] as well as Pagano-Volpin, 2005 [31]) and subsequently also taken up by Amable and Gatti (2005 [6]). The model is built on a particular time sequence: in the first period, it is assumed that firms are created and labour contracts established; in the second period, policy decisions are taken on the values of institutional variables; finally, in the third period, production takes place and wages are paid.

On the basis of their socioeconomic profile, we can distinguish three groups (homogeneous in size) of actors/citizens:

- the educated bourgeoisie (hereafter referred to as socioeconomic group BE)

- the working class (hereafter referred to as socioeconomic group CP from the french term "classes populaires")

- the financial elite (hereafter referred to as socioeconomic group EF)

The distinction between these groups is further elaborated in the rest of the paper on the basis of the following criteria: the main source of income (labour vs. capital);

the level of education and consumption; transport and mobility patterns. These groups participate, through voting, in the establishment of a government that will take political decisions concerning, among other things, laws that protect:

- natural resources

- capital (value of company shares)

Citizens choose whom to vote for on the basis of an economic interest calculation based on their own utility functions. Utility functions are specific to the group whom the individual belongs to. In this economy, groups seek institutional protection in order to preserve their welfare and the resources on which that welfare depends: the natural and social environment.

2.1 Green growth, Degrowth and the Green New Deal

As argued in the Introduction, environmental shocks and distributional conflicts are seen as fundamentally interrelated: a sustainable growth trajectory is defined by its natural and societal resource protection characteristics.

Concerning natural resources RN, we consider that their dynamics over time follows the following process:

$$RN_{t+1} - RN_t = f(RN_t) - d \cdot RN_t$$

The environment is renewed through a spontaneous (or induced) process of creation of new resources, captured by the function $f(RN_t)$; however, it undergoes a spoliation due to polluting economic activities that deteriorate a proportion d of existing resources,

with $1 \geqq d \geqq 0$. Nowadays, the situation of environmental emergency implies that spoliation is dominating the renewing of natural resources. We can suggest that the "Degrowth scenario" eases the dynamics of natural resources thanks to a decrease in the value of d brought about by shrinking economic activities and the reconversion of polluting companies; with specific investments, this could go as far as improving the renewal capacity of the environment. Concerning the "Green growth scenario", benefits to the environment primarily stem from the conversion of polluting activities. As for the "Green New Deal case", it adds to previous features an additional social dimension because it takes into account and address more specifically the distributive conflicts.

In the rest of the paper, we shall consider these different alternatives as possible outcomes based on the choices made by actors and socio-economic groups regarding the variables that characterise the institutional framework. To do so, two sources of risk and conflict are taken into account in our model[1]:

- environmental shocks that destroy natural resources and thus threaten long-term growth (this depends on the value of d ;

- conflicts over wealth sharing (e.g. protection of capital vs. improving low incomes).

Conjecture 1 *Environmental shocks lead to the progressive depletion of environmental resources. The source of these shocks is identified at the level of human economic activities (production, over-urbanisation, transport, over-exploitation etc.). Damages to the environment yield deteriorations of people living as well as working conditions. The*

[1] We find the same concerns in the recent literature as shown for instance in the contribution by Klein (2021 [21])

degradation of natural resources also impacts on consumption habits, as these turn towards more ecological goods and services. These transformations exacerbate inequalities across socioeconomic groups and ultimately impact on social cohesion.

Legislation can protect the environment and thus reduce the impact of shocks. Companies are confronted with taxes and other constraints imposed to fight against environmental deteriorations. Polluting companies see environmental regulation as a brake on economic activity stemming from constraints on standards, on industrial practices, on transports. At the same time, new non-polluting companies emerge which benefit from public support, including through transfers or subsidies.

Concerning capital, weak legislative protection can lead to various forms of "spoliation" of the gains associated with productive activities: illegal spoliation through bribery, corruption, misappropriation but also legal taxation on profits. In the following, we consider that the protection given to capital investments secures the companies gains and is perceived -by a part of the population, i.e. the working class- as a form of redistribution towards financial capital owners.

More precisely, we make the assumption that firms profits are secured to a given proportion λ ; hence, the coefficient $1 - \lambda$ can simply be seen as the tax rate on profits: the degree of redistribution in favour of low income classes depends negatively on the degree of protection granted to capital investments.

The two institutional dimensions included in the model are

$0 \leq \lambda \leq 1$ the degree of capital vs. low income protection

$0 \leq e \leq 1$ the level of environmental protection.

In connection with environmental protection legislation, taxes and subsidies are put in place, which reallocate resources between polluting and non-polluting companies:

$B(e)$ = environmental taxes

$I(e)$ = environmental grants

V_p = value of polluting companies

V_{np} = value of non-polluting companies

By combing polluting and non-polluting companies, we find that firms total value is equal to $V = V_p + V_{np}$. The shares of these companies can in principle be held by individuals from the three existing socioeconomic groups; however, we make the assumption that those shares are actually held by the financial elite and, to a lesser extent, by the educated bourgeoisie:

a_p^{EF} = proportion of polluting companies owned by the financial elite

a_{np}^{EF} = proportion of non-polluting companies owned by the financial elite.

We define the same parameters a_i^{BE} for the educated bourgeoisie. The assumption is made that $a_i^{EF} + a_i^{BE} = 1$ for $i = p, np$ in order for all companies shares to be placed in private actors portfolios: either the financial elite acquires them or the shares are held by the educated bourgeoisie either directly or indirectly (via investment funds for example).

2.2 Firms value

The value of companies is determined by the dividends that they distribute, which are equal to the difference between profits (net of taxes) and any environmental taxes payable by companies (e.g. carbon tax). We assume that environmental legislation acts through taxes and subsidies granted to companies according to their characteristics (polluting vs. non-polluting): $\frac{\partial B}{\partial e} > 0$ with $B(0) = 0$ and that, for the sake of simplicity, $B(e) = B \cdot e$. Corporate profits are also taxed in order to promote redistribution. The amount of profits distributed depends positively on the protection given to investments: a part $1 - \lambda$ is levied in the form of taxes that shall be used to finance redistribution. Moreover, we define Π_p = profits from polluting companies and Π_{np} = profits from non-polluting companies.

From these specifications, the value of polluting enterprises is determined as follows:

$$V_p = \lambda \cdot \Pi_p - B(e) = \lambda \cdot \Pi_p - B \cdot e$$

while the value of non-polluting companies is equal to

$$V_{np} = \lambda \cdot \Pi_{np} + I(e) = \lambda \cdot \Pi_{np} + I \cdot e$$

Firms are divided between the two typologies P and NP ; we define $1 - k$ the share of type-NP firms : it follows that $k \cdot B \cdot e = (1 - k) \cdot I \cdot e$ hence $I \cdot e = \frac{k}{1-k} \cdot B \cdot e$. We shall determine the equilibrium value of k below.

Indeed, the profits associated with the two types of firms are determined on the

basis of the difference between the productivity of jobs and the wages that are paid. Let us consider an economy populated by a given number of firms that employ labour as the sole factor of production. These firms are characterized by two possible levels of productivity: $m_H > m_L$. Individual firm's profit is equal to $m_i - w$, with $i = H, L$. Two wages exist and are set according to individual skill levels: $w_S > w$. The former remunerates skilled labour while w is proposed to low skilled employees and is supposed to be equal to the minimum wage, *i.e.* the SMIC in France. As we are interested in the effects of wage inequalities on political and institutional decisions, we simply assume that $w_S = x \cdot w$ with $x > 1$. The value of this parameter, measuring the ratio of skilled to unskilled labour wages, allows us to pick the degree of inequalities.

Polluting companies are characterised by a low level of productivity (equal to m_L) except in the case of reconversion; they reconvert to non-polluting activities, following the deterioration of the natural resources that they are exploiting, with a probability equal to the rate d of spoliation of the environment. This conversion is costly, which deprives non-polluting firms of part of their rent. We consider that non-polluting firms massively adopt technological innovations and thus reach a level of productivity equal to m_H which however includes the cost of depollution.[2] Non-polluting firms can lose their technological lead and their label (and thus become polluting again) with a probability σ.

The profits for a firm of type P or NP are respectively specified as follows:[3]

[2] See for instance Colombelli et al. 2020 [15] for empirical evidence on the linkages between green conversion, technological innovation and firms'market value.

[3] Hereafter we develop a simplified model in which firms can change their state based on given transition probabilities. Our specification is a simplified version of more comprehensive and complex models

$$\begin{aligned}\rho \cdot \Pi_p &= m_L - w + d \cdot (\Pi_{np} - \Pi_p) \\ \rho \cdot \Pi_{np} &= m_H - x \cdot w + \sigma \cdot (\Pi_p - \Pi_{np})\end{aligned}$$

with $\rho =$ discount rate. The above equations can be rewritten as follows:

$$\begin{aligned}\Pi_p &= \frac{d \cdot (m_H - w \cdot x) + (\rho + \sigma) \cdot (m_L - w)}{\rho \cdot (d + \rho + \sigma)} \\ \Pi_{np} &= \frac{(d + \rho) \cdot (m_H - w \cdot x) + \sigma \cdot (m_L - w)}{\rho \cdot (d + \rho + \sigma)}\end{aligned}$$

We can show that, in this economy, the proportion of non-polluting firms is $1 - k = \frac{d}{d+\sigma}$, this proportion is increasing as a function of d. In fact, given transition probabilities d and σ, the long-run probability of a firm being of type NP is equal to the sum of the probability d of becoming NP-type conditional to the firm being type P plus the probability $1 - \sigma$ of remaining type NP conditional to the firm being already NP. This long-run probability gives us the equilibrium proportion of non-polluting firms in this economy $1 - k$. Hence, we shall solve the equation $1 - k = d \cdot k + (1 - \sigma) \cdot (1 - k)$ and finally find the value $k = \frac{\sigma}{d+\sigma}$. The same reasoning applies to the long-run probability of a firm being of type P. We consider hereafter that there are fewer type-NP than type-P firms; this amounts to retaining the assumption $d < \sigma$ about transition probabilities.[4]

in the literature such as Amable and Gatti 2004 [5], Saint Paul 2000 [33] as well as Saint Paul 2002 [34].

[4] If $d = \sigma$ firms are equally distributed over type NP and type P. This implies $I \cdot e = B \cdot e$

The difference in profits between the two types of companies is

$$\Pi_p - \Pi_{np} = \frac{(m_L - w) - (m_H - w \cdot x)}{\rho + d + \sigma}$$

In this paper, we consider that this difference is positive, in particular because of the existence of a clean-up cost linked to the green conversion of polluting companies. This allows us to explain that not all firms choose conversion from the outset, despite the fact that it delivers a higher level of productivity. Given this assumption, we can show that an increase in the environmental degradation coefficient d leads to lessen the gap between the profits of type-P and -NP firms: $\frac{\partial(\Pi_p - \Pi_{np})}{\partial d} < 0$ the difference between the two profits values decreases as a function of d.

2.3 Socioeconomic groups preferences over institutional variables

The financial elites derive their income from the shares of the companies they own. For the sake of simplicity, we specify the coefficients a_p^{EF} and a_{np}^{EF} as follows: $a_p^{EF} = a_{EF} \cdot a$ and $a_{np}^{EF} = a_{EF} \cdot (1 - a)$. This specification allows us to pick a as a parameter grasping the way that the financial elite combines the shares of the two types of companies, a acting as a sort of cursor characterising the more or less "green" nature of the financial elites' choices (these choices are actually greener as the a value falls). Knowing that $I \cdot e = \frac{k}{1-k} \cdot B \cdot e$ with $k = \frac{\sigma}{d+\sigma}$ we find $I \cdot e = \frac{\sigma}{d} \cdot B \cdot e$ which finally yields:

$$
\begin{aligned}
U_{EF} &= a_{EF} \cdot [a \cdot V_p + (1-a) \cdot V_{np}] \\
&= a_{EF} \cdot \left[a \cdot [\lambda \cdot \Pi_p - B \cdot e] + (1-a) \cdot \left(\lambda \cdot \Pi_{np} + \frac{\sigma}{d} \cdot B \cdot e \right) \right] \\
&= a_{EF} \cdot \lambda \cdot (a \cdot \Pi_p + (1-a) \cdot \Pi_{np}) + a_{EF} \cdot ((1-a) \cdot \frac{\sigma}{d} - a) \cdot B \cdot e
\end{aligned}
$$

We can easily see that the institutional preferences of the elites towards capital protection λ are unambiguously positive: $\frac{\partial U_{EF}}{\partial \lambda} = a_{EF} \cdot (a \cdot \Pi_p + (1-a) \cdot \Pi_{np}) > 0$. Concerning the protection of environment (i.e. variable e), the sign depends on the value of a which indicates the proportion of polluting companies in the elite's portfolio: $\frac{\partial U_{EF}}{\partial e} = a_{EF} \cdot ((1-a) \cdot \frac{\sigma}{d} - a) \cdot B$.

Conjecture 2 *Given the institutional and sociological conditions in advanced countries, we assume that the financial elites invest heavily in polluting firms and has little sensitivity to environmental issues. On this ground, our starting assumption is that the proportion of type- P companies in the total assets held by the financial elite is higher than their share in the firms population,*[5] *that is* $a > \frac{\sigma}{\sigma+d}$ *; it follows that* $\frac{\partial U_{EF}}{\partial e} < 0$.

Hereafter, we stick to this conjecture. However, we will also consider a scenario in which the introduction of environmental legislation may lead the financial elites to shift their preferences towards a growing proportion of non-polluting economic activities (see Section 4 on the greening of elites, where we study the case $a < \frac{\sigma}{\sigma+d}$).

[5] *This amounts to assuming that type P companies are over-represented in the "portfolio" of the financial elite.*

For the educated bourgeoisie as well as for the working classes, our hypothesis is that the utility derived from income must be considered net of transport costs: travel between home and work introduces a disutility linked to the latter. Moreover, in our advanced societies the issues associated with transport costs seem to crystallise important expectations and frustrations, as shown by the vehement demands of social movements such as the recent "Gilets jaunes" in France. The assumptions we make in this regard are likely to create a fundamental divide between the educated bourgeoisie and the working classes: while the former are riding the green wave, the latter are tensing up and resisting the wave.

Conjecture 3 *The educated bourgeoisie lives in urban areas, more or less close to job locations; they can limit their costs by using environmentally friendly means of transport: bicycles, walking, electric cars, public transport. Environmental legislation makes these alternative means of transport more accessible; subsidies can even be offered (e.g. free public transport). As a result, transport costs for the educated bourgeoisie are decreasing thanks to environmental legislation:* $\frac{\partial ct_{BE}}{\partial e} < 0$.

Hereafter, for the sake of simplicity, we set transport costs equal to $ct \cdot (1 - e)$. The educated bourgeoisie is characterised by high levels of income ($w_S = x \cdot w$) and consumption and develops consumption habits that are compatible with the environment and can favour the development of non-polluting companies (organic, fair trade, etc.). Concerning the investments to which the educated bourgeoisie has access, we know that the proportions of shares owned by them are equal to $1 - a_{EF} \cdot a$ for polluting companies

and $1 - a_{EF} \cdot (1 - a)$ for non-polluting companies. Given that $a > \frac{\sigma}{\sigma+d}$ it follows that the share of non-polluting companies is higher than among the financial elite. This is consistent with a vision of choices being made by the educated bourgeoisie in a way that is enlightened and compatible with the requirements of sustainable development. We can finally write:

$$\begin{aligned} U_{BE} &= x \cdot w - ct_{BE} + (1 - a \cdot a_{EF}) \cdot V_p + (1 - (1 - a) \cdot a_{EF}) \cdot V_{np} \\ &= x \cdot w + \lambda \cdot [(1 - a \cdot a_{EF}) \cdot \Pi_p + (1 - (1 - a) \cdot a_{EF}) \cdot \Pi_{np}] \\ &\quad + ((1 - (1 - a) \cdot a_{EF}) \cdot \frac{\sigma}{d} - (1 - a \cdot a_{EF})) \cdot B \cdot e - ct \cdot (1 - e) \end{aligned}$$

Regarding the preferences of the educated bourgeoisie towards capital protection we have $\frac{\partial U_{BE}}{\partial \lambda} = [(1 - a \cdot a_{EF}) \cdot \Pi_p + (1 - (1 - a) \cdot a_{EF}) \cdot \Pi_{np}] > 0$; these preferences are positive and have the same sign as those of the financial elite. As for the protection of the environment, the preferences are given by the following marginal utility:

$$\frac{\partial U_{BE}}{\partial e} = ct + ((1 - (1 - a) \cdot a_{EF}) \cdot \frac{\sigma}{d} - (1 - a \cdot a_{EF})) \cdot B$$

The sign of this derivative is always positive if $(1-(1-a)\cdot a_{EF})\cdot \frac{\sigma}{d} - (1 - a \cdot a_{EF}) > 0$ that is if $a > \frac{d-(1-a_{EF})\cdot\sigma}{a_{EF}\cdot(d+\sigma)}$. Given that $\frac{\sigma}{\sigma+d} > \frac{d-(1-a_{EF})\cdot\sigma}{a_{EF}\cdot(d+\sigma)}$ our previous assumption (*i.e.* $a > \frac{\sigma}{\sigma+d}$) implies that the preferences of BE are positive with respect to environmental legislation.

The working classes are characterised by income w and by a moderate to low level

of consumption. This low level of consumption reduces their ecological footprint but, unlike the educated bourgeoisie, the consumption habits of the working classes do not favour the development of non-polluting enterprises. Furthermore, we consider that the share of capital in their wealth is zero: the working classes do not draw income from financial capital investments. On the other had, individuals belonging to this socio-economic group have incomes that depend, at least in part, on aid and transfers granted by the state: allowances, price and rent moderation, etc.

Conjecture 4 *The net incomes of the working classes are particularly affected by transport costs because this segment of the population often lives far from its jobs locations: environmental protection pushes up the costs of car transport (increase in petrol prices, road fares, car fares, etc.). Therefore, overall, transport costs for the working class increase following the introduction of environmental protection legislation:* $\frac{\partial ct_{CP}}{\partial e} > 0$. *The incomes of the working classes are also affected by the consequences of capital protection. The redistribution in favour of low income people is in fact equal to a fraction* $(1-\lambda)$ *of the profits from both polluting and non-polluting companies:* $T = (1-\lambda) \cdot (\Pi_p + \Pi_{np})$.

In line with transport costs specification for educated bourgeoisie, we assume CP transport costs equal to $ct \cdot e$. One finally gets

$$\begin{aligned} U_{CP} &= w - ct_{CP} + (1-\lambda) \cdot (\Pi_p + \Pi_{np}) = \\ & \quad w - ct \cdot e + (1-\lambda) \cdot (\Pi_p + \Pi_{np}) \end{aligned}$$

We can calculate the marginal utilities $\frac{\partial U_{CP}}{\partial e} = -ct < 0$ and $\frac{\partial U_{CP}}{\partial \lambda} = -(\Pi_p + \Pi_{np}) < 0$. The effect of environmental protection legislation e on the utility of the working classes depends solely on the transport cost channel. This legislation therefore has a negative impact on the well-being of individuals belonging to this socioeconomic group, who are by the way also opposed to capital protection: the latter acts as a lever against redistribution in favour of low income people.

3 Political decisions on institutional variables

Given the assumptions, conjectures and formalisations set out in the previous sections, we can summarise the signs of the preferences over legislations associated with individuals belonging to each of the three socio-economic groups using the following table:

Table 1

	e	λ
Educated Bourgeoisie	+	+
Working class	-	-
Financial elite	-	+

3.1 A simple majority system with disjoint votes

We consider that the three socioeconomic groups have a similar weight in the population of voters. Each group is represented in the legislature by a political party in the same proportions as the weight of the group in the population: hence each party can rely on one third of the "parliamentary" seats when the votes are called upon on the values of

the two institutional variables e and λ. To ensure a majority result, these votes can be disjoint, i.e. the decision on environmental legislation can be taken separately from that on social legislation.

More specifically, only those values of variables λ and e that are line with the structure of preferences presented in Table 1 are put to the vote: for all socioeconomic groups, the preferred options correspond to the corner solutions. Concerning environmental protection, the alternative choice proposed to the vote is between $e = 1$ (BE's preferred option) and $e = 0$ (CP's and EF's best choice), while for capital protection/taxation, it is between $\lambda = 1$ (BE's preferred option and EF's choice) and $\lambda = 0$ (CP's choice).

When a vote is called upon on environmental legislation (i.e. on the value of e) the three parties' representatives vote by majority: as one can see from Table 1, majority (i.e. two groups/parties out of three) stands for the lowest possible value of e. This yields a winning result which occurs to be the best choice stemming from CP and EF preferences: the value of e is thus set to zero and no protective legislation for natural resources is put in place. Similarly, when a vote is held on capital protection legislation (*i.e.* the value of λ) the parties' representatives of two out of three parties (e.g. the educated bourgeoisie and the financial elite parties) stand for the highest possible value of capital protection and, as a consequence, no redistribution in favour of the CP: the winning result is λ set to 1.

Under these circumstances, the disjoint votes lead to the set-up of following institutional framework:

- $e^*_m = 0$ that is no environmental protection (thanks to the votes of CP's and EF's

parties, against the preferences of the educated bourgeoisie)

- $\lambda_m^* = 1$ that is maximum capital protection (following the votes of BE's and EF's parties, against the preferences of the working classes)

Given these results, we can see that the prevailing institutional framework does not ensure any form of environmental protection and thus satisfies the demands of both the financial elite and the working class; indeed for the latter, the protection of natural resources raises the costs associated with its polluting sorts of transports. However, in the prevailing institutional framework, no form of redistribution is implemented either and this is detrimental to the needs of the low-income population. From a social point of view, this institutional framework is harsh. Nevertheless, it corresponds to the scenario preferred by the financial elite, which is therefore the real winner of the majority vote. The other two groups (BE and CP) have to deal with this outcome which leads to a combination of institutional arrangements that do not maximise their welfare. Both groups would prefer a different institutional framework: more environmentally oriented (for the BE) and more redistributive (for the CP).

3.2 People's Green Coalition

In this section, we follow the approach proposed by Pagano-Volpin (2001) [30] and study the emergence of a coalition in our model. Given the outcome of the majority votes we studied in the previous section, if the political system makes it possible, two-party coalitions can emerge between the elected representatives of the three socioeconomic groups: we will show later in this section that the BE's and the CP's parties have a

bargaining range because they can trade less capital protection in exchange for more environmental protection and thus give rise to what we call a "people's green coalition".

More specifically, in line with the analytical framework of our model, we take up the distinction proposed by Le Breton-Van der Straeten (2017) [26] between "electoral" and "governmental" alliances and we focus on the case of alliances emerging during elections. In order for a stable coalition to emerge, we need to make assumptions about the political framework in which inter-party bargaining takes place: not all electoral regimes are equivalent in this respect. In particular, following Pagano-Volpin (2001) [30], we assume that possible coalitions are formed according to the following time sequence:[6] 1) the three parties representing the socio-economic groups try to create coalitions of a maximum of two parties, given that each party can participate in only one coalition at a time - the coalition is associated with an electoral platform including the selected values of the two institutional variables - if this step fails, one goes directly to step 3; 2) the voters of the three groups vote by majority for or against the platform carried by the coalition resulting from the previous step - if a winning result emerges, the electoral process stops here (no step 3); 3) a majority vote takes place with disjoint votes on the two institutional dimensions (as in the previous Section).

During stage 1, a negotiation between the parties is carried out with the aim of reaching agreement and thus being able to bring to vote, in a coordinated manner, the choice of an institutional framework different from that resulting from disjoint majority vote.

[6] According to the results of Pagano-Volpin (2001) [30], in this type of models there is no "strong political outcome" in the sense of Aumann (1959) [10]; not even the result stemming from the majority system under disjoint voting.

We consider that such examples of coalition have been observed in our socioeconomic systems, for example with the various "rot-grüne" or "grün-roten" coalitions in Germany at various times, sometimes at the level of the federal government, sometimes at the level of the Länder. Stage 1 is a process of "pooling" between parties (*i.e.* potential coalition allies), which results in a platform of "negotiated" values of institutional variables. We assume that this "pooling" amounts to a search for the values of institutional arrangements that maximise a shared objective function within the electoral coalition.

In step 2, the set of "rules of the game" (*i.e.* the values of the two institutional variables) carried on by the possible coalition are put to a democratic vote (more precisely, majority vote) with the understanding that the platform thereby brought to vote can only win if it delivers -to the (voters of the) concerned parties- a level of utility not lower than the one associated with disjoint majority vote - the latter is therefore the outside option foreseen in step 3.

First, we check the existence of a bargaining space in step 1. To do so, we consider the indifference curves for each of the CP, BE and FE groups and calculate their slopes. As an example, we know that the iso-utility curve for CP is defined by $U_{CP}(e,\lambda) = \overline{U}_{CP}$ and the total differential is written as $\frac{\partial U_{CP}}{\partial e} \cdot de + \frac{\partial U_{CP}}{\partial \lambda} \cdot d\lambda = 0$ which gives us the slope of the indifference curve $\frac{de}{d\lambda} = -\frac{\frac{\partial U_{CP}}{\partial \lambda}}{\frac{\partial U_{CP}}{\partial e}}$. The corresponding slope values for the three socioeconomic groups follow:

- $\frac{\partial U_{CP}}{\partial e} = -ct$ et $\frac{\partial U_{CP}}{\partial \lambda} = -(\Pi_p + \Pi_{np})$. As a result, the slope of the indifference curves associated with the utility function of the CP is $\frac{de}{d\lambda} = -\frac{\Pi_p + \Pi_{np}}{ct} < 0$;

- $\frac{\partial U_{BE}}{\partial e} = ct + ((1-(1-a)\cdot a_{EF})\cdot\frac{\sigma}{d} - (1-a\cdot a_{EF}))\cdot B$ and

$\frac{\partial U_{BE}}{\partial \lambda} = [(1-a\cdot a_{EF})\cdot\Pi_p + (1-(1-a)\cdot a_{EF})\cdot\Pi_{np}]$. Concerning BE, one has $\frac{de}{d\lambda} = -\frac{(1-a\cdot a_{EF})\cdot\Pi_p+(1-(1-a)\cdot a_{EF})\cdot\Pi_{np}}{ct+((1-(1-a)\cdot a_{EF})\cdot\frac{\sigma}{d}-(1-a\cdot a_{EF}))\cdot B} < 0$;

- $\frac{\partial U_{EF}}{\partial e} = a_{EF}\cdot((1-a)\cdot\frac{\sigma}{d} - a)\cdot B$ and $\frac{\partial U_{EF}}{\partial \lambda} = a_{EF}\cdot(a\cdot\Pi_p + (1-a)\cdot\Pi_{np})$. For EF one obtains $\frac{de}{d\lambda} = \frac{a\cdot\Pi_p+(1-a)\cdot\Pi_{np}}{((1-a)\cdot\frac{\sigma}{d}-a)\cdot B} > 0$.

Proposition 5 *The indifference curves of BE are characterised by a higher slope than those of CP.*

Proof. We can prove that $\Pi_p+\Pi_{np} > (1-a\cdot a_{EF})\cdot\Pi_p+(1-(1-a)\cdot a_{EF})\cdot\Pi_{np} \Leftrightarrow \Pi_p\cdot(a\cdot a_{EF})+\Pi_{np}\cdot((1-a)\cdot a_{EF}) > 0$. Moreover, with $a > \frac{d-(1-a_{EF})\cdot\sigma}{a_{EF}\cdot(d+\sigma)}$ one has $ct < ct+((1-(1-a)\cdot a_{EF})\cdot\frac{\sigma}{d}-(1-a\cdot a_{EF}))\cdot B$. As a result, $\frac{\Pi_p+\Pi_{np}}{ct} > \frac{(1-a\cdot a_{EF})\cdot\Pi_p+(1-(1-a)\cdot a_{EF})\cdot\Pi_{np}}{ct+((1-(1-a)\cdot a_{EF})\cdot\frac{\sigma}{d}-(1-a\cdot a_{EF}))\cdot B}$.

■

Regarding the possibility that a coalition emerges at stage 1 that delivers a higher level of utility than the result of disjoint majority vote, we note that no such solution is available to the EF party. This is because the EF party maximises its utility in disjoint vote: it cannot credibly propose an alternative at this stage. The question arises whether EF can create a coalition in response to the fact that the opposing parties will be able to form one. In other words, can EF credibly divert either of the other two parties away from the coalition they have formed together? On the one hand, we have assumed that a coalition is formed once and for all, so we have ruled out the possibility of outbidding to form new coalitions. On the other hand, it is always in EF's interest to withdraw from a coalition in which his group participates in order to precipitate the

electoral process to stage 3, where the process ends in a disjoint vote with a result that is most favorable to EF. This seems to us to make any possible coalition offer by EF in the context of this model implausible.

Concerning BE and CP parties a bargaining is possible because the utility levels of individuals from their corresponding socioeconomic groups can be improved. We also note that, based on the above Proposition, between the BE and CP indifference curves there is a bargaining space that contains a set of points delivering higher utility levels to these two groups than the disjoint voting solution. This situation is illustrated in Figure 1 below.

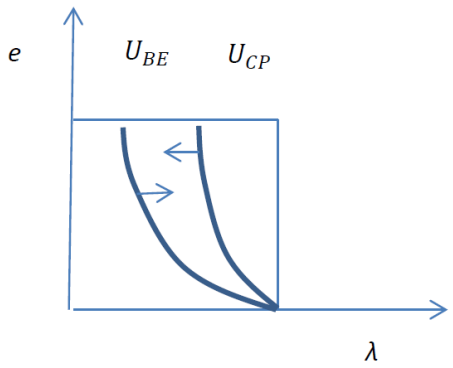

Figure 1

The $BeCp$ alliance (between the educated bourgeoisie and the working class) allows the set-up of an institutional framework protecting natural and social ressources if and only if

- $1 \geqq e^*_{BeCp} > 0$, yielding a non-zero level of environmental protection (as advocated by the educated bourgeoisie);

- $0 \leqq \lambda^*_{BeCp} < 1$, yielding a non-zero effort of redistribution in favour of the low-

income population (as requested by the working classes).

We ask ourselves the following question: what institutional solutions $(e^*_{BeCp}, \lambda^*_{BeCp})$ can credibly be put in place by a coalition between the BE and CP parties? We consider that the establishment of this common platform is based on a Nash bargaining process between the two potentially allied parties. The maximisation of utilities within the coalition takes the following form (under the hypothesis of equitably distributed bargaining power within the alliance):

$$Max \left\{ \begin{array}{c} Log\left[U_{BE}(e,\lambda) - U_{BE}(e^*_m, \lambda^*_m)\right] + \\ Log\left[U_{CP}(e,\lambda) - U_{CP}(e^*_m, \lambda^*_m)\right] \end{array} \right\}$$

This process is about each party within the coalition implementing a solution that extracts a higher level of welfare (for individuals belonging to concerned socioeconomic groups) than the solution resulting from the disjoint majority vote. We can calculate the values of the utility functions:

$$U_{CP}(e,\lambda) - U_{CP}(e^*_m, \lambda^*_m) = -ct \cdot e + (1-\lambda) \cdot (\Pi_p + \Pi_{np})$$

$$\begin{aligned} & U_{BE}(e,\lambda) - U_{BE}(e^*_m, \lambda^*_m) \\ = \; & ct \cdot e - (1-\lambda) \cdot [(1 - a \cdot a_{EF}) \cdot \Pi_p + (1 - (1-a) \cdot a_{EF}) \cdot \Pi_{np}] \\ & + ((1 - (1-a) \cdot a_{EF}) \cdot \frac{\sigma}{d} - (1 - a \cdot a_{EF})) \cdot B \cdot e \end{aligned}$$

Let us define $F(e,\lambda) = Log\left[U_{BE}(e,\lambda) - U_{BE}(e_m^*,\lambda_m^*)\right] + Log\left[U_{CP}(e,\lambda) - U_{CP}(e_m^*,\lambda_m^*)\right]$ and calculate F's first derivatives with respect to the two variables (e,λ). For the sake of simplicity, we define the following functions and polynomials:[7]

$$K = ct \cdot d + ((1-(1-a)\cdot a_{EF})\cdot\sigma - (1-a\cdot a_{EF})\cdot d)\cdot B$$

$$K_2 = d\cdot((1-a\cdot a_{EF})\cdot\Pi_p + (1-(1-a)\cdot a_{EF})\cdot\Pi_{np})$$

$$B(e,\lambda) = ct\cdot e - (1-\lambda)\cdot(\Pi_p + \Pi_{np})$$

$$A(e,\lambda) = ct\cdot d\cdot e - d\cdot(1-\lambda)\cdot[(1-a\cdot a_{EF})\cdot\Pi_p + (1-(1-a)\cdot a_{EF})\cdot\Pi_{np}]$$

$$+((1-(1-a)\cdot a_{EF})\cdot\sigma - (1-a\cdot a_{EF})\cdot d)\cdot B\cdot e$$

Given these notations, the partial derivatives of $F(e,\lambda)$ can be written as follows:

$$\frac{\partial F}{\partial e} = \frac{K}{A(e,\lambda)} + \frac{ct}{B(e,\lambda)}$$

$$\frac{\partial F}{\partial \lambda} = \frac{K_2}{A(e,\lambda)} + \frac{\Pi_p + \Pi_{np}}{B(e,\lambda)}$$

The two first-order conditions can be written:

$$\frac{\partial F}{\partial e} \gtreqless 0 \Rightarrow \frac{B(e,\lambda)}{A(e,\lambda)} \gtreqless -\frac{ct}{K}$$

$$\frac{\partial F}{\partial \lambda} \gtreqless 0 \Rightarrow \frac{B(e,\lambda)}{A(e,\lambda)} \gtreqless -\frac{\Pi_p + \Pi_{np}}{K_2}$$

[7] The calculations are presented in more detail in Annex 1.

Given the way these first-order conditions are written, it is impossible that they are satisfied at the same time. We show in Appendix 2 that if $\frac{ct}{K} < \frac{\Pi_p+\Pi_{np}}{K_2}$ then the coalition contains no better solution than the disjoint majority vote results. Hence, we consider hereafter only the case where $\frac{ct}{K} > \frac{\Pi_p+\Pi_{np}}{K_2}$.

Under this assumption, two cases are indeed possible. In the first case, when $\frac{\partial F}{\partial e} = 0 \Rightarrow \frac{B(e,\lambda)}{A(e,\lambda)} = -\frac{ct}{K} < -\frac{\Pi_p+\Pi_{np}}{K_2}$, then $\frac{\partial F}{\partial \lambda} < 0$: the coalition stands for the lowest possible value of λ. This delivers us a first set of solutions stemming from the $BeCp$ alliance:

$$S_1 \Rightarrow \begin{cases} \lambda^1_{BeCp} = 0 \\ \\ 1 > e^*_{BeCp} > 0 \end{cases}$$

Similarly, a second case arises when $\frac{\partial F}{\partial \lambda} = 0 \Rightarrow \frac{B(e,\lambda)}{A(e,\lambda)} = -\frac{\Pi_p+\Pi_{np}}{K_2} > -\frac{ct}{K}$ then $\frac{\partial F}{\partial e} > 0$: the coalition stands for the highest possible value of e. This yields a second set of solutions within the $BeCp$ alliance:

$$S_2 \Rightarrow \begin{cases} e^2_{BeCp} = 1 \\ \\ 1 > \lambda^*_{BeCp} > 0 \end{cases}$$

As the analytical values of these solutions are given by complexe functional forms, we select to stick to numerical exemples in line with the assumptions made in the previous Sections of the paper. Finally, we consider the particular case where $d = \sigma$ and retain

the following set of values for some of the model parameters:

Table 2

$a_{EF} = a =$	1
$w =$	1
$\rho =$	1
$m_L =$	$\frac{m_H}{2}$
x	3

Given this set of parameter values, the solution S_1 is written:

$$S_1 \Rightarrow \begin{cases} \lambda^1_{BeCp} = 0 \\ e^1_{BeCp} = \frac{B\cdot(1+2d)\cdot(3m_H-8)+ct\cdot(m_H\cdot(5+9d)-14-24d)}{4ct\cdot(B+ct)\cdot(1+2d)} \end{cases}$$

In principle, we can show that there exists a set of parameters values yielding a solution e^1_{BeCp} whose level is positive and lower than 1. We can easily show that the value of e^1_{BeCp} increases when the proportion d of deteriorated environmental resources rises; this positively responds to the political demand of greater protection over natural resources.

Concerning the solution S_2, given Table 2 assumptions, it can be written as follows:

$$S_2 \Rightarrow \begin{cases} \lambda^2_{BeCp} = 1 - \frac{B\cdot(1+2d)}{(2+3d)\cdot m_H-6-8d} - \frac{ct\cdot(d\cdot(9m_H-24)+5m_H-14)}{(3m_H-8)((2+3d)\cdot m_H-6-8d)} \\ e^2_{BeCp} = 1 \end{cases}$$

Here again, we can find a set of parameters values yielding a positive λ^2_{BeCp} with level lower than 1. In this case, if we do not restrict the value of parameter x, we can show that λ^2_{BeCp} decreases when the inequality level (measured by x) rises. The latter result points to the fact that the political demand for redistribution - such as it is expressed by the working class - is reflected in the institutional framework proposed within the People's Green Coalition. This alliance allows for the establishment of an institutional framework that responds to the need of protecting both natural and social resources. This implies the implementation of a legislation that effectively protects the environment coupled with a redistributive effort in favour of the low-income population: given the selected values of the coefficient λ measuring capital protection legislation, we can see that the coalition sustain investments taxation in order to finance redistribution.

The solutions that we have just analysed improve the welfare of the educated bourgeoisie and of the working classes in relation to their respective levels of utility associated with the outcome of the disjoint majority vote. On the other hand, the welfare level of the financial elite is undermined. The latter might try to build alliances around an alternative outcome, but the credibility of such a move may be problematic. In fact, as noted in previous Section, a coalition is formed once and for all, therefore the possibility of outbidding to form new coalitions is ruled out; moreover, the EF has an interest to withdraw from any coalition in which its group takes part, in order to force the electoral process to stage 3, where the process ends up in a disjoint vote.

However, we shall take seriously the threat in terms of utility loss, which is posed to the financial elite by the people's green coalition; this threat is likely to put a pressure on

the EF group and party to change their economic and political preferences. This pressure is exerted in the same direction as that linked to the ecological transition process.

4 The greening of the financial elite

The financial elite is subject to two kinds of pressures. First, as we have just seen, the people's green coalitions lead to institutional frameworks featuring capital taxation and redistribution as well as (more or less extended) environmental protection. In both cases, these institutional arrangements are not favourable to the financial elite. Secondly, the EF group is exposed to the pressure exerted by the processes of transformation stemming from the ecological transition of firms' economic activities. The changes taking place at the companies level have an impact on the portfolio choices made by the financial elite. The rise of green finance is an evidence of these transformations (see Crifo-Durand-Gond, 2020 [16]). In our paper, we take this mechanism into account through the effects of a more rapid deterioration of natural resources (increase in d) which leads to a decrease in the profit advantage of polluting companies (see Section 2.2 above).

Given these pressures, we conjecture that the orientation of the financial elite changes, specifically in terms of the share of their portfolio investments devoted to non-polluting activities, which leads us to consider a scenario where the value of the parameter a decreases.

Conjecture 6 *In the context of the ecological transition process, the share of investments in polluting companies among the financial elite decreases while the share of non-*

polluting companies increases, so that in the end $\frac{\sigma}{\sigma+d} > a > \frac{d-(1-a_{EF})\cdot\sigma}{a_{EF}\cdot(d+\sigma)}$*: the financial elite undergoes a process of greening and becomes a "green financial elite".*

With a parameter $a < \frac{\sigma}{\sigma+d}$, the political preferences of the elite with respect to environmental protection change sign and become positive, while the sign of the preferences of the educated bourgeoisie does not change because we still have $a > \frac{d-(1-a_{EF})\cdot\sigma}{a_{EF}\cdot(d+\sigma)}$.

Table 3 shows the new political preferences:

Table 3

	e	λ
Educated Bourgeoisie	+	+
Working class	-	-
Financial Elite	+	+

With such a specification, we find that the two groups of the educated bourgeoisie and the financial elites become *de facto* allies: their political preferences have the same sign although their utility functions remain different. An "extended bourgeois bloc" becomes dominant and advocates for institutional arrangements that protect capital and the environment in a complementary way. In the case of a majority vote as the one studied in Section 3.1, the result now is:

$$e_m^G = 1$$

$$\lambda_m^G = 1$$

This institutional framework fully corresponds to the best choices that could be made by the two groups supporting it: no coalition can deliver them a better result. Moreover,

this institutional framework is twice penalizing for the working classes because it entails, on the one hand, an environmental policy that yields costs for them -particularly in terms of transport- and on the other hand, a capital protection legislation that shelters profits from taxation for redistribution purposes. All of this is detrimental for the CP that does not benefit from any form of redistribution and whose transport bills are further increased by strict ecological rules.

In such a context, the existence of this "de facto alliance" prevents the CP from forming an alternative coalition that could improve the fate of low-income people: the working classes are in a sense "left behind". There is no electoral outcome that would allow them to win their case. We speculate that this context is conducive to the working classes transforming their forms of political struggle: abandoning the hope of changing things via the electoral ballot, they turn to more radical forms of political struggle such as street fighting and riots. An example of this transformation is given, in our view, by the "Gilets jaunes" movement in France, with its slogans against the protection of capital but also against certain sorts of environmental protection (*i.e.* "pro-car" activists).

5 Conclusion

The analysis presented in this paper aims to shed light on the issues related to the emergence of institutional arrangements favourable to the protection of natural and societal resources: legislation in favour of redistribution and the environment.

We consider that arrangements over these two dimensions are entangled and emerge as a result of voting. To study the issue, we have proposed a political economy model with

three socioeconomic groups called upon to vote on the two above-mentioned institutional dimensions: the educated bourgeoisie, the working class and the financial elite share the political spectrum and the seats in the legislature. The first two groups differ as far as their preferences for redistribution are concerned as well as concerning the way environmental protection impacts on their transport costs. The last group plays a key role.

We study the results of political votes, in terms of the institutional framework chosen by the actors, under different assumptions concerning the political system: disjoint voting under majority system versus a coalition system. The main results of our analysis are that the financial elite takes advantage of its pivotal role in a disjoint majority voting system. However, a people's green coalition can emerge out of bargaining among educated bourgeoisie and working classes, whose redistributive and green choices go against the preferences of the financial elite. Finally, the greening of the latter ensues with, as a possible consequence, the isolation of the working classes on the political chessboard. This isolation can lead the working classes to switch to more radical forms of political struggles. The question arising at this stage is how to get out of the impasse into which the political system is led by the greening of the financial elites.

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Annex 1

Partial derivatives with

$$K = ct \cdot d + ((1 - (1 - a) \cdot a_{EF}) \cdot \sigma - (1 - a \cdot a_{EF}) \cdot d) \cdot B$$

$$K_2 = d \cdot ((1 - a \cdot a_{EF}) \cdot \Pi_p + (1 - (1 - a) \cdot a_{EF}) \cdot \Pi_{np})$$

$$B(e, \lambda) = ct \cdot e - (1 - \lambda) \cdot (\Pi_p + \Pi_{np})$$

$$A(e, \lambda) = ct \cdot d \cdot e - d \cdot (1 - \lambda) \cdot [(1 - a \cdot a_{EF}) \cdot \Pi_p + (1 - (1 - a) \cdot a_{EF}) \cdot \Pi_{np}]$$

$$+((1 - (1 - a) \cdot a_{EF}) \cdot \sigma - (1 - a \cdot a_{EF}) \cdot d) \cdot B \cdot e$$

$$\frac{\partial F}{\partial e} = \frac{K}{A(e, \lambda)} + \frac{ct}{B(e, \lambda)}$$

$$\frac{\partial F}{\partial \lambda} = \frac{K_2}{A(e, \lambda)} + \frac{\Pi_p + \Pi_{np}}{B(e, \lambda)}$$

If $\frac{ct}{K} < \frac{\Pi_p + \Pi_{np}}{K_2}$ then the coalition does not include any better solution than the result associated to the disjoint majority vote system. In fact, in this case, when $\frac{\partial F}{\partial e} = 0 \Rightarrow \frac{B(e,\lambda)}{A(e,\lambda)} = -\frac{ct}{K}$ then $\frac{B(e,\lambda)}{A(e,\lambda)} > -\frac{\Pi_p + \Pi_{np}}{K_2}$ and $\frac{\partial F}{\partial \lambda} > 0$ hence $\lambda = 1$. We can show that, when $\frac{\partial F}{\partial e} = 0$ the optimal value of e corresponding to $\lambda = 1$ becomes $e = 0$. The same reasoning applies to the case where $\frac{\partial F}{\partial \lambda} = 0$.