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Planning and sustainable development in the twenty-first century

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Abstract

Although fallen into disrepute in the 80s, the use of planning has been put back on the agenda, with the 2008 financial crisis, but also with the growing recognition of the inability of nowadays societies to tackle their long-term development challenges. Thirty years later, I follow the Malinvaud-Chakravarty's line of reasoning by questioning the form and usefulness of collective planning. A review of recent insights from different fields of economic thoughts shows that what may be lacking is good formation and coordination of expectations (expectational coordination, public economics, political economics, collective decision making and planning). I elaborate on one particular analytical approach to planning, the main objective of which is to foster collective deliberation and bargaining. Rather than determining *alone* what is *the* optimal policy, a 'dialogue analysis' aims at clarifying the sources of disagreements about the best design of sustainable development strategies. Two applications confront this theoretical reflexion to concrete challenges of the twenty-first century: The design of national strategies against climate change and carbon pricing policies.

Keywords

Planning, sustainable development, economic analysis and modelling, collective action

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Résumé

Si la planification a été déconsidérée à partir des années 80, elle revient à l'ordre du jour avec la crise financière de 2008, mais aussi avec la reconnaissance croissante de l'incapacité des sociétés à relever leurs défis de développement à long terme. Trente ans plus tard, je reprends le raisonnement de Malinvaud-Chakravarty en questionnant la forme et l'utilité d'une planification collective. Une revue de différents domaines de la pensée économique montre qu'il manque une bonne formation et coordination des anticipations (coordination des anticipations, économie publique, économie politique, choix collectif, planification). Je considère en particulier une approche analytique de la planification, dont le principal objectif est de favoriser la délibération et la négociation collective. Plutôt que de déterminer *seule* quelle est *la* politique optimale, le rôle principal d'une « analyse de dialogue » de ce type est de clarifier les sources de désaccords sur la meilleure stratégie de développement durable. Deux applications confrontent cette réflexion théorique aux défis concrets du XXIe siècle : la conception des stratégies nationales pour atténuer les changements climatiques et l'élaboration de politiques de tarification du carbone.

Keywords

Planification, Développement durable, Analyse économique et modélisation, Action collective

1. Introduction

Economic planning seems to have regained some appeal nowadays. While there was much enthusiasm and optimism for planning in the economics profession after the 50s, it was fallen into disrepute in the 80s. The attempt of influential economists who were convinced of the usefulness of some form of planning remained a dead letter (see Sukhamoy Chakravarty, "Development planning: a reappraisal", 1991, and Edmond Malinvaud, "The future of economic planning", 1992). The use of planning, however, has been put back on the agenda with the 2008 financial crisis, but also with the growing recognition of the inability of nowadays societies to tackle their long-term development challenges.

The underlying problem has a long and ramified history in economics: How to design institutional arrangements to promote better economic coordination? By institutional arrangements one would think about classical oppositions such as the State *versus* the Market, Capitalism *versus* Communism. Malinvaud and Chakravarty called for going beyond such Manichean oppositions: The Berlin Wall fell, but what can still be learned from planning experiences? Can we sort out what is useful from what should really be left behind?

In very much of the economics literature the term *planning* is obviously taken to be self-explanatory, not in need of any further definition and elaboration. However, it may be useful to delineate at the outset the type of collective planning we shall consider, while keeping in mind that our inquiry also aims to question and examine the type of planning that could be relevant to meeting the challenges of the twenty-first century. As a starting point, let us refer to the Leif Johansen's definition of 'macroeconomic planning' (1977, 48):

> "Macroeconomic planning is an institutionalized activity by, or on behalf of a Central Authority for (a) the preparation of decisions and actions to be taken by the Central Authority, and (b) the

coordination of decisions and actions by lower-order units of the economy, as between themselves and vis-à-vis the Central Authority, for the purpose of governing the development of the whole economy and its constituent parts so as to achieve certain (more or less detailed and more or less explicitly specified) goals for the economy and harmonize the development of the economy with broader non-economic goals."

This definition encompasses diverse possible forms of planning at the society level, while leaving open the question of what is *good* planning. In particular, the definition does not say anything about how to strike the best balance between (a) and (b), the two sphere of planning activity. The historical experiences of socialist planning, as a 'command economy', putting more weight on (a) and market-oriented economies with 'indicative planning' emphasizing (b). In the remainder of the paper, we shall closely examine the form and question the *quality* of collective planning: the way in which information and expectations are produced and socialized, and how the nature of institutional arrangements and decision-making procedures may help promote the coordination of decisions and actions.

After a quick reminder of the Malinvaud and Chakravarty's contributions on the elucidation of the advantages and disadvantages of planning, I will use more recent insights coming from different fields of academic thoughts. It is not the purpose of this paper to provide an exhaustive and comprehensive review. I propose a selective journey through different lines of reasoning. My aim is to discuss and re-examine two intertwined questions:

1/ *The general nature of the problem*: Why the emergence of a collective coordination on a desirable project is not spontaneous? Why some form of planning may be useful?

2/ *Feasible contributions of economic analysis* to the search for concrete solutions: What economists can and cannot say about large collective plans and policies? What relevant and reliable information can they produce to usefully inform decision-making processes?

A non-exhaustive theoretical overview shall lead me to acknowledge the limits of knowledge and of the experts' capacity to formulate (alone) what is *the* optimal economic plan and intervention. To be aware of this point, however, does not condemn the usefulness of economists and their analyses. It only suggests that, to be more relevant, the economists claims might have to remain modest, in particular when it comes to advise real policy plans and actions. I will then sketch one direction of feasible and relevant contributions adapted to democratic and multi-stakeholders decision-making contexts. Although the determination of optimality is out of reach, the contribution remains ambitious. The important 'facts' to be captured in the analysis are not only those that come from the state of the art in academia, but also from the various stakeholders' views about the future constraints and objectives of collective projects. The main role of such analysis is to clarify the sources of disagreements on the best project designs (decision framing, objectives, means, and realization conditions).

Section 2 recalls the Malinvaud-Chakravarty's line of reasoning and the main insights they provide about the usefulness and challenges of planning. Section 3 and 4 deepen the question of the nature of the problem and possible solutions, using more recent insights from different economics fields: expectational coordination, public economics, political economics, collective decision making and planning. We give some implications for the contribution of economic analysis and sketch the route for a 'dialogue' approach. Section 5 reflects on two concrete applications: the design and choice of a National Strategy against

climate change and a national carbon price system (illustrated with the French case). Section 6 briefly concludes.

2. The Malinvaud and Chakravarty's call

As contributors to development economics and economic theory, practitioners of concrete planning in their respective countries, Chakravarty and Malinvaud wrote to defend the usefulness of planning after the collapse of the economic block. Both authors acknowledged that the problem with planning does not come from the lack of analytical power. The XXth century has seen both tremendous improvements in data, computational power, and a whole apparatus of theoretical and technical bases available for planning analyses. Rather, their explanations evoked the conditions under which the analytical exercises was conducted and the very framing of the analysis, in a broad sense of the term.

After listing the main practical problems, Chakravarty synthetized the challenge: "The arguments against planning are by no means conclusive. They amount to a case against certain types of planning, especially against excessive central planning, which has been attempted by socialist countries […] What they do suggest by implication is something much more important, namely, that the 'quality' of planning is much more important than the 'quantity' of planning" (p 10). In addition, both authors provide parallel arguments against the "*cliché*" that alternative institutional arrangements would be more desirable *in general*. In particular, that "an ill-functioning market system is greatly to be preferred to an ill-functioning government" (p. 13). I do not attend to paraphrase their analyses any further. My purpose here is just to mention what they thought was missing for a good 'quality of planning'.

Both authors stressed that the important tasks were to 1/ remove the ambiguity about what planning had to be; 2/ adapt its analytical approach accordingly; 3/ use it more wisely.

(1) It is clear that planning as a "command economy" is a very extreme and naïve conception. As noted by Malinvaud, overconfidence is needed to think that "economies could overcome the great uncertainties to which they are exposed, and could rationally and satisfactorily deal with the many complex problems they are facing" (p. 16). Neither he thought that, at the other extreme, a purely 'indicative planning' in a free market economy was desirable; considering both the classic arguments for public good provision and public policy design, but also for the production of collective information useful to individual agents. A function of planning that Chakravarty called "instrumental inference": to facilitate the emergence of a certain level of social consensus on the directions of desirable change. Quoting Ayeres, Chakravarty also stressed the institutional innovation as another major function of planning (to remove the 'institutional obstructions' that inhibit economic progress).

(2) The deep uncertainty and complexity of large economic problems make the analytical tools developed by economics useful (input-output analysis, cost-benefit analysis, econometric and simulation models, etc.), but limited in providing definite answers and solutions. Malinvaud noted that "the tools have not proved to be inappropriate, but rather to have a much more narrow function than was once believed and to be less accurate" (p. 17). While Chakravarty acknowledged the Lange's critics of the 'mindless perfectionism' in which some planners engage, noting that overdetailed description is neither necessary nor sufficient for a good plan. "There is a great temptation to ignore what is not easily quantifiable" and "very insufficient use of the insights that can be contributed by other social sciences" (other than economics and engineering). He also asserted by experience that

"very few planners think of 'optimality' […] Most of them look for *corridors* of action which indicates the first few feasible steps in a forward direction [… and] corrective action based on the progress of plans".

(3) A good use of planning in specific decision contexts and with respect to specific challenges also deserve careful attention, as past experiences are full of examples of unwise planned reforms and policies. History has shown us both the difficulties of good government and the pitfalls of a deregulated market economy. Although the latter assertion was much less obvious by the time Chakravarty and Malinvand wrote. Within market economies, Malinvaud summarizes, "economic planning has three main functions: it must look into the future and announce its likely features; it must define strategies; it must evaluate public projects and control their realization" (p. 22). Defining overall development strategies, programmes for different sectors (transport, energy, etc.), details of public policies, regulations, and even desirable directions for private investments, consumption modes and innovations, a plan is not only 'indicative'. If not, it must be acknowledged that the choice of strategies belong to those in charges, not solely to the government. The importance of a 'concerted planning' (Malinvaud) is also stressed for its function of 'instrumental inference' (Chakravarty), as "prior collective examination of the options usually results in a better choice" (Malinvaud, p. 22).

Without going into the details and nuances of their arguments, I would like to suggest that their diagnosis is still (and perhaps even more) relevant for the challenges of the XXIs century. To put it roughly, the tremendous acceleration of the speed of time and the increased complexity of the world since the industrial revolution question the very ability of

rational societies to efficiently handle their interconnected challenges and act collectively[2]. In the last thirty years following their writing, the great technical advances in analysis have proved to be insufficient – sometimes inaccurate – for identifying solutions for long-term decision-making problems and broad policy issues. Their call to pay more attention to relevance than technicity remains essential. Let us now go to the intersection of five academic perspectives in order to clarify further the nature of the analytical problem and measure progress towards solutions.

3. Nature of the problem: Coordination of beliefs and expectations

On the theoretical ground, the economic literature has provided a massive amount of analytical critics and alternative assumptions about both articles of faith: the Perfect Markets Hypothesis and the Enlighted Social Planner Ideal. Beyond these two overoptimistic and polar views, a crucial problem and central challenge for any institutional arrangement and any mode of economic regulation has been pointed out: *What may be lacking is a good formation and coordination of beliefs and expectations*.

The question of the coordination of expectations has been examined and debated theoretically since the 1950s and 1960s, mostly in response to the optimism of that time about Keynesian macroeconomic policies: a 'relevant economic theory' should account for and capture the forcasting capacities of economic agents: their expectations (Muth, 1960; Lucas, 1972). They can be fooled once, but not endlessly (implicitly, by the governments' monetary and fiscal stimuli). General economic equilibria then became not only equilibria of

[2] It is interesting to note that this issue was perhaps even more visible at the early stage of the industrial revolution, as people would have remembered 'the old time' and would not have been used to 'disruptive' and 'backstop' innovations. In his discourse on *The Outlook for Intelligence*, Paul Valéry (1935) was worried about the very capacity of human brains to handle such an increasing complexity. His outlook on the ability of minds remains relevant. How to remain aware of what is important and form clear representations of desirable actions?

plans and prices, but also equilibria of expectations, which lies behind the rational agents' strategies and decisions. Any economic model and economic analysis thus includes, explicitly or implicitly, assumptions about the nature and the formation of agents' forecasting.

The Perfect Market model requires a 'Rational Expectation Hypothesis' (REH), which became dominant in modern macroeconomics and modelling since the 80s[3]. A perfect and complete public information is assumed to be available to all economic agents - about both the present and the future - and this information is perfectly synthetized and transmitted to all by the Market Institutions, through effective price signals. Away from this assumption that poses empirical and epistemological difficulties (Guesnerie, 2013), a 'Bad' formation and coordination of expectations is a fundamental source of market failures. This may arise from the incompleteness and/or inadequacy of individuals' knowledge and forcasting capacities, but also non convergence of possible expectational coordination processes towards a stable and correct set of collective conjectures at the society level (this was also true in the static story of a perfect market economy, where the Walras' *Main invisible* or convergence of the *tâtonnement* process is a necessary brick in the Perfect Markets edifice, as it is required for a good coordination of agents' decisions *via* market-clearing prices).

3.1 Implications for the scope and power of economic analysis

This theoretical line of reflection underlines not only a crucial and general problem for economic performance. It also questions the economics profession (see Frydman and

[3] The reverse is not true. The Rational Expectation Hypothesis is not sufficient for Efficient Markets. For instance, Desgranges and Heinemann (2008) show that, in the neighbourhood of an efficient equilibrium, rational expectations do not spontaneously lead to a good transmission of information through market prices. The reason is that market participants have little incentive to transmit their private information when the market provides too much information. In other terms, if they trust the markets, their personal actions will barely reflect their private (good but limited) information. If everybody does that, the market will receive little information, and rational expectations will not spontaneously lead to the informational efficiency of markets.

Phelps, 2013). What are the limits of the analyses? What are the right ambitions and useful analytical strategies?

Firstly, economists cannot represent endogenously and mathematically the real economic agents' forecasting, as their models are 'fully determined'. Encouraged by the Lucas' critic (1972) and the conception of 'microfoundations' only as 'strong internal model consistency', a dominant part of the economic modellers have built and refined reduced-form equations to represent endogenously the forcasting strategies of economic agents. Real Business Cycle Models, New keynesian models, and other largely used models, assume agents' forecasting routines that are structurally stable, mechanical, and simple enough to be modelled endogenously. The Rational Expectations hypothesis (REH) has become the required paradigm and premise to any relevant theory and scientific approach in economics.

Secondly, economists have proven to be unsuccessful in their attempts to develop an alternative way to represent endogenously the agents' expectations (see for instance the critics of the Adaptive Learning econometric Models of Evans and Honkapohja, 2005, chapter 2). Nonroutine changes and forecasting revisions, maintained errors, misinformation, self-fulfilling expectations, competing beliefs and limited learning capacities of agents are all crucial factors of the real world outcomes. The fact that economists cannot specify and capture those elements in predefined equations has led them to make considerable forecast errors. The incapacity of mainstream models and economists to foresee the real financial market developments and the 2008 crisis is a telling example.

However, the recognition of the importance of nonroutine changes and fundamental knowledge imperfections is not enough to resolve questions about the best institutional arrangements and the relevant analytical strategy. Among the supporters of the Market

Institution against Central Planning, Hayek (1978) and Friedman (1968), famously claimed that the government is unable to know when and how a discretionary change in policy might affect the economy, to argue that Central Planning is impossible in principle, and thus the administrations should be limited to stick to fixed rules (for example, a central bank inflation-control rule). However, as noted by Frydman and Phelps: "such argument […] cannot support the claim that allowing policy discretion would necessarily result in inferior economic performance" (2013, 37). The ability of economists to define what are the right rules may not be greater, as this ability depends on their overarching capacity to grasp the real agents' forecasting and responses to nonroutine changes (again, a crucial premise to any model used to derive a prescribed rule). The real markets either are not exempt from knowledge imperfections, short-termism, non-valuated externalities, information manipulation, vicious games, strategical interactions, and the many other sources of imperfections documented in the economic literature. In short, nothing can be said *in general* about the best institutional arrangement without careful context-specific inquiry.

3.2 Indecision of policy recommendations away from the Perfect Economy Benchmark

The fundamental limitation of economists to identify the right model of the world and the best institutional arrangements also appear in the Public Economics literature. The reference to a Perfect Market Economy ideal – as formalised by the Arrow-Debreu's general equilibrium model, its Perfect Market-Clearing Assumptions and the Rational Expectations Hypothesis – has been used as a benchmark for the economists' policy analysis and recommendations. Public Economists derive a 'first-best optimal policy' by adding one or two well identified sources of market failures to the Benchmark Model and identify the marginal policy intervention that restores the efficient Pareto allocation. Public intervention

is called for as Market Prices no longer equate the 'social opportunity costs' or the 'social values of commodities' (Drèze and Stern, 1987). However, the Second-Best Theory has shown that when at least one optimality condition required for the first-best optimal solution cannot be met, then the other conditions need not to be part of the 'second-best' optimal solution (Lipsey and Lancaster, 1956).

Let us take an example. Assume that the social cost of CO_2 emissions is not valued by the market prices of fossil energies, and therefore taken into account by producers and consumers. This 'externality' is the only market failure added to the benchmark model of a Perfect Market Economy. The Welfare Theorems tell us to implement a uniform corrective Pigouvian tax on fossil fuels: a same tax to all agents and equal to the assessed marginal climate change damage due to one additional tonne of CO_2 (assuming that we can know this marginal consequence for the society). The tax equalise the marginal private costs with the marginal social benefits of not emitting this additional tonne of CO_2. Thus, the tax restores the optimal Pareto allocation by correcting market price signals. In addition, the second Theorem of Welfare tells us to implement monetary lump-sum transfers to correct for unequitable distribution (if the higher fossil energy tax weights disproportionally more on the poor). However, imagine that such lump-sum transfers are not feasible - or distort the optimal allocation – for other reasons, for instance, because the fiscal administrations cannot observe the required private information (Mirrlees, 1971). Then Sandmo (1975) shows that the corrective tax on fossil energies need not to be either uniform (among the poor and the rich), nor equal to the Pigouvian level (it may also be used for other purposes, such as contributing to raise public revenue and to finance other public goods).

Beyond this particular example, we learn from the second-best literature as a whole that the normative optimal recommendations of economists about the design of public interventions are most of the time sensitive to uncertain or debated assumptions made about the functioning of the economy, in particular the planner's objectives, his instruments and the constraints circumscribing their use (Drèze and Stern, 1987, 953). Again, the informational constraints – in our taxation example, those of the fiscal administrations – limit the set of 'feasible policies' and the nature of the optimal second-best design (Guesnerie, 1998). More generally, all assumptions made about the decision context are crucial in ordering alternative public policy candidates, and identifying *the* optimal solution. That includes assumptions about the social, political, and decision-making constraints that limit the scope for efficient and feasible planners' intervention.

In sum, outside of the consensual Benchmark models of Perfect Market Economy and Omnipotent Social State, the recent literature about expectations and second-best policies show fundamental limitations in the economists' capacity to embrace the complexity of the world in their models. These limitations oppose their desire and attempts to provide strong economic forecasts and real-world policy recommendations. In particular, there are fundamental *knowledge limitations* about the functioning of our complex socio-technical-political-economic systems, with no scientific consensus on one alternative general theory.

3.3 The posture and role of economists in real decision making

In this context, the dominant posture has been to stay anchored to the well-defined and consensual ideal reference of Rational Expectations and Perfect Market Economy. However, Economists may feel trapped between two unsatisfactory approaches. On the one hand, the scientific approach consisting in adding 'step by step' plausible assumptions about the

constraints that narrow the efficiency of markets and the 'control era' of public intervention lead to insufficient progress toward real policy design. The reason is that the second-best optimal policy can completely change 'at each step' or with alternative plausible assumptions about the relevant constraints. On the other hand, if economists accept to assume one particular model of 'real imperfect world', they may increase relevance, but may be exposed both to critics (no scientific procedure to select the right theory) and to risks of misdiagnosis, bad policy recommendations, and possibly real disastrous consequences.

This has led experienced economists, unsatisfied with the epistemological flaws of this approach, to conclude that "to be more relevant, our knowledge claims might have to become more modest" (Guesnerie 2013, 64). "Recognizing the limits of economists' knowledge" is necessary in order to give "an autonomous role to market participants expectations and yet to avoid presuming that they forgo profit opportunities systematically [that is, to avoid the Lucas' critic]" (Frydman and Phelps, 2013, 14). Referring to the theory of 'Sunspots', Hahn and Solow (1997, 150) concluded their critical essay on modern macroeconomic theory by pointing that "it is important that something more be added: the belief held by the various participants in the economy. 'Beliefs' include ordinary expectations and conjectures about prices, incomes, and various aggregates; we also intend the word to cover attitudes and even theories about the way the economy works. The way the economy actually does work can depend on the way agents believe the economy actually work."

4. Looking for relevant and practicable contributions: recent literature

So what can be done? I first stress three reasons for accepting the risks of venturing far from the anchoring of the first-best model, even in the absence of *the* consensual model.

i) Scientific framing of economic controversies. In real policy contexts, the stakeholders involved in collective decision-making processes *de facto* held various beliefs and views about the economy and the constraints and objectives of collective action. Considering models with non-marginal, uncertain, but plausible, sources of sub-optimality forces a rational confrontation of diagnoses about the nature and magnitude of inefficiencies. This approach does not resolve the discussion about *the* right model of the word and *the* optimal policy, but it allows political deliberations and the confrontation of arguments to be backed by analysis. Eventually a 'shared vision' may emerge about collective action.

ii) Analysis of some critical policy issues. Some key real policy problems are minimised – or even does not have an existence at all – in the neighbourhood of the first-best model. This is the case for the present discussion of the role of public policy and planning. In the neighbourhood of the Perfect Market Equilibrium with Perfect Rational Expectations, the role left to exogenous intervention for improving the economic situation is very narrow. Other important policy discussions, such as trade-offs and interactions between Equity and Efficiency, take a non-problematic and trivial existence in the first-best world. The assumed Separability between Equity and Efficiency issues remains conventional, while the empirical and epistemological flaws of this working hypothesis are well known (Guesnerie, 1995; Drèze and Stern, 1987). Implications of alternative assumptions should be explored.

iii) Co-evolution and dialogue between economic analysis and real policy discussions. The Lucas's (1972) critique has been very influential in undermining the credibility of any approach attempting to assume exogenous imperfect expectations, instead of endogenous Rational Expectations. Following Muth (1961), the 'relevant theory' has been interpreted in terms of 'consistency' of the modelled outcomes and modelled expectations; and the right way of caring about 'microfoundations' has been interpreted as fully pre-determine agents'

consistent forecasting with mathematical equations. The optimistic philosophy behind this approach amounts to assuming that the Economists can essentially identify what are the 'best' agents' strategies, and therefore their interests. For those rational agents would also see these prospects in the real world: "if your reveals profit opportunities, you have the wrong theory" (Lucas 2001, 13). However, in a world of imperfect knowledge, one may equally assume a more complex interaction between expertise and decision: economists and stakeholders contribute to co-build their forecasting and learn from each other.

In sum, looking for other approaches is relevant not only for epistemological reasons, but also for concrete policy deliberations and collective choices. Following Hourcade (1991, 304), we may rephrase the challenge: "More than a problem of imperfect information and market failures to 'fix', the problem we are facing is about the formation and the coordination of expectations. More than a decision problem under uncertain 'future states of the world', we are facing collective decision-making problems under scientific controversy. 1/ The decision must be made while the right 'theory' about the future cannot be selected scientifically among competing candidate theories. 2/ The fact of choosing - explicitly or not - among the available set of plausible theories causes a self-fulfilling prophecy mechanism in the society that changes the actual probability distribution of occurrence of the future states of the world"[4].

4.1 Starting point and inputs to the analysis: the 'facts' about the 'state of the debate'

Let us now assume that the analysis cannot fully predetermine and endogenise the causal process leading to a (good or bad) formation and coordination of expectations.

[4] The theory of 'sunspots' provides a formalized example of how beliefs can be or become self-confirming (Woodford, 1986). Other theories formalize diverse beliefs equilibria (Kurz, 1994), or the nature of general economic equilibria under the assumptions of Imperfect Knowledge Economics (Frydman and Goldberg, 2011).

Nevertheless, one must have an idea of how this causal process works within a broader system that includes the economic analysis, but *cannot be fully captured by it*. Understanding this system requires drawing on theories and knowledge coming from other social sciences. Available insights about the main political, social, institutional, and even psychological factors that influence decision-making become valuable. They provide not only a better understanding of the current state of competing beliefs and theories, but also information about the relevance of economic analysis: Is the information produced useful for stakeholders' decisions?

It is not the purpose of this article to provide an interdisciplinary review on this subject. Let me just mention here few recent and valuable directions for a research agenda. A first direction can be labelled under the umbrella-term 'Acceptability Analyses'. The objectives of which is to examine the factors of success and failure of real policy implementation. They contribute to analyse the actors' perceptions, positions, and interactions, about alternative policy options (including the *status quo*), as well as to shed light on the political process through which a 'vision of the world' takes the lead and is 'adopted' politically.

Going back to our carbon-pricing example, a recent bulk of analyses examines why there is a 'recurrent implementation gap'. There is a *hiatus* between the recommendation to implement a carbon price – consensual among economists – and nearly thirty years of political rejection (Hourcade and Combet, 2017). These analyses include behavioural economics studies that focus on understanding the individuals' perceptions (Carattini et al., 2018), political sciences analyses on the political factors and stakeholders' interaction processes (Rafaty, 2018), and reviews of policy evaluations and policy perceptions, whose

purpose is to help measure the state of what is known and what is debated (Klenert et al., 2018).

These analyses contribute to gather empirical knowledge about how participants form their forecasts in the real world. This corresponds to the Phelp's initial vision of a microfoundations research program, "the 'imagined world' relative to which market participants' maximize in making decisions" (Frydman and phelps, 2013, 7), "the existing belief and the forces that may influence them" (Hahn and Solow, 1997, 154), the 'fictional expectations' anchored in 'narratives' (Beckert and Bronk, 2019; Shiller, 2019). Therefore, the *state of the debates* become a crucial empirical 'fact', and its description a starting point for the real decision-making analysis. By 'the state of the debates', we mean 1/ the current state of the experts' knowledge (critical review of what is known and unknown, the boundaries and domain of validity of the analyses) and 2/ the current state of the stakeholders' forecasts.

It may be worth noting that what makes a policy optimal in this overall decision-making system is not clear. In other terms, acceptability studies does not tell us who holds the right vision of the world and what is the best society project. Nevertheless, starting from a 'bad' socioeconomic equilibrium, an intervention (either through a shift of the market participants' expectations, or through public policies), may be able to push the system toward a better one. There is no *a priori* preference for the *status quo*. In certain occasion, the government can help coordinating beliefs and expectations on a more desirable outcome. There is *a priori* room for useful planning organised by the state institutions.

Difficulties come when one wants to elucidate how a right theory emerges. With the parallel risk that the reverse occurs. It is equally possible that the belief that becomes

dominant and self-confirming brings the system toward an even worse equilibrium (if the 'sunspot' in the terms of Woodford (1986) prove not to be an improving direction in the real world). This is a case where 'acceptability' may not be aligned with 'general interest'. What matters then is the 'quality' of the decision-making process, its governance: the best rational use of available knowledge, the quality of the collective deliberation and bargaining processes.

4.2 Back to the 'quality' of collective planning: the pre-eminence of the political process

This theoretical and epistemological discussion comforts the first two general directions pointed by Chakravarty and Malinvaud for 'qualitative planning': 1/ the importance of planning as an instrument for forming and coordinating strategies toward a desirable project ('instrumental inference'); 2/ experts should provide both more modest and more ambitious analysis. One achievable ambition for analysists is not to determine alone *the optimal policy*, but to compare competing theories and beliefs about the future (as important 'facts').

The third point is also problematic. How to use planning more wisely in real decision-making processes? Prompted by the challenges of the XXI century, in particular the management of transitions towards climate-resilient and sustainable development pathways, the development literature has also deepened the reflection (Mancebo and Sachs, 2015). In practice, what is prevalent is the quality of the political processes that lead to collective choices. Transition to sustainability requires a social movement for change. Planning has a role to play in creating the conditions of emergence of 'new social contracts': sufficiently large and voluntary associations of communities, stakeholders and groups of individuals. For such a contract to emerge, the political process should lead to a 'shared vision'.

It is worth insisting that the 'governance issues' have a central role to play in this success. Firstly, political sciences have underlined the key role of the level of Trust and the legitimacy of the decision-makers for the success of democratic processes in general (Rosanvallon and Goldhammer, 2008). It is also true for the acceptance of specific policies, for instance, carbon pricing (Klenert et al., 2018). An agreement on the procedure is also an important pre-condition to embarking a large number of constituencies in the decision-making process, with their honest wills to find a consensus solution and stick to it.

However, I have not given so far any alternative decision-making procedure to select the 'best' society project. Let me just stress that this problem should be re-examined. This relates to the unresolved question about how a 'good' vision of the world emerges in the absence of all-powerful social planners or scientists. In other words, how a 'Common Good' emerges from human struggles and group interests?[5] Only careful political system analysis can provide knowledge and improving directions for decision making. Here we reach the porous borders with the realm of political sciences. Without going beyond that border, let us just acknowledge that questioning the quality of the choice amounts to questioning real political processes[6].

From that perspective the political choices have pre-eminence. A qualitative planning should help understand "the main arguments to be taken into account in order to reach the 'best' solution in very situation where a (collective) choice is needed" (Comeliaud, 2015, 25). The classical separation between a political judgement about 'the goals' and a 'rational'

[5] Joseph Schumpeter clearly expressed this prevalence of politics: "Policy is politics; and politics is a very realistic matter. There is no scientific sense whatever in creating for one's self some metaphysical entity to be called 'The Common Good' and a not less metaphysical 'State', that, sailing high in the clouds and exempt from and above human struggles and group interests, worships at the shrine of the Common Goods" (1949, 208).

[6] We do not discuss here the procedure through which a good coordination of judgement may emerge from the confrontation of individual judgements. We know from the famous Kenneth Arrow's theorem and the following literature that this can be problematic (Arrow 1963, 1984; Sen 1970; List and pettit, 2002).

experts' judgment about 'the means' (adapted to that ends) is not fully relevant. As noted before, this rational judgement has to be accepted only if it is based on consensual premises, a largely shared model of the future. Analyses dedicated to fuel the debates and the political choices must provide their insights before the decision unfold. At that time, the political outcomes, either the trade-offs between competing goals or the common vision towards a desirable future, are not yet available as inputs for the analysts' evaluation.

4.3 Planning under imperfect knowledge and heterogeneous beliefs

The direction of planning we are portraying corresponds to a large extent to the conception of the French Planning in the aftermath of World War Two. In the typology proposed by Loucks (1975), this type of planning correspond to 'compromise planning', which differs from 'prediction planning' (reliable forecasting by experts using analytical techniques), 'conventional planning' (central planners select the strategy that minimize the expected deviations from clear targets), and 'optimization planning' (discussed above). A sequential and iterative approach is required as the trade-offs and compromise solutions among competing objectives and forecasting beliefs are not known *ex ante* by the analysts.

The fundamental constraint on the planning approach comes from the limitation of knowledge and the irreducible uncertainty. The French *Prospective* and the Anglo-Saxon *Futurology*, through a variety of approaches, adopt a close intellectual posture towards an "exploration of the future - not of a deduced future, but of a plurality of imagined futures" (Pierre Massé, 1965 (1991), 20). The goal is to take a unique decision in the present moment, while there is a plurality of possible futures. In so doing, Massé explained us that the exploration should be large ("an open attitude towards an open future"), but limited to relevant and coherent expectations: the projected futures should have an 'internal

consistency' and abstract from what is not superfluous for the decision under consideration. In practice, clarity about the criteria of coherence and relevance requires constant efforts.

Secondly, as we start from a current situation, a set of decisions should be clearly identified and be compatible with the realisation of these expectations. This 'plausible historical causality' is required for the emergence of a shared conviction that this future path is practicable and those future outcomes achievable. A practicable path should be considered plausible with respect to the physical, economic, political and social constraints of the moment. As Massé summarizes, "if this set of decisions is taken, the plausible situation becomes likely". He noted that, in general, the choice supposes a trade-off between desirability and likelihood. In other terms, resilient or robust strategies require polyvalence, and this comes at a cost.

4.4 Approaches and Methods for choices under deep uncertainty: Recent literature

Recent analytical methods have been developed for planning under irreducible uncertainty and partial knowledge (Marchau et al., 2019). A 'decision making under deep uncertainty' (DMDU) is defined as "a situation in which the experts do not know or the parties to a decision cannot agree upon (1) the appropriate models to describe the interactions among a system's variables, (2) the probability distributions to represent uncertainty about key variables and parameters in the models, and/or (3) how to value the desirability of alternative outcomes." (Lempert et al., 2003)

This line of research is active and has recently developed a number of methodologies with the aim of supporting and improving real decision-making processes in practice. These methods have in common to seek for *robust decisions* with respect to various forms of uncertainties, in situations where no probabilistic distributions can be attached to the

parameters of one model. Therefore, the standard Morgenstern and von Neumann's expected utility theory cannot be computed to choose the best strategy, as any other unique decision criterion applicable to a known and reliably quantified set of risks (Knight, 1921). A menu of methodological proposals is now available for diverse decision-making circumstances under deep uncertainty (Hallegate et al., 2012, Marchau et al., 2019).

These methodologies make use of the increased computational power to carry out strategic planning analyses. The contributions of these analytical approaches – which I cannot discuss in depth here – rest on a paradigm made up of three key constituents (Kwakkel and Haasnoot, 2019): (i) Exploratory Modeling; (ii) decision support; and (iii) adaptive planning.

(i) Quantitative scenario building is used to explore plausible futures. Instead of assuming one model structure and comparing the performance of alternative policies in one particular deterministic future world (people 'agree-on-assumptions'), the approach try to explicit a wide range of possible sources of uncertainty and to analyse how the choice of a strategy is altered by different possible futures ('agree-on-solutions'). In practice, numerous numerical models simulations are used to evaluate the sensitivity of the strategies' outcomes to 1/ the values of the model parameters and 2/ the causal structure of the modelled system (variables, parameters, equations, etc.). The analytical process is intrinsically embedded within the deliberation process, with political and organisational conditions to be met in order to actually converge to a 'good' collective decision.

(ii) In practice, multi-agents decision-making processes are dynamic and often repeated political games. What is required is an *iterative approach that facilitates a collective and evolutive learning* across alternative framings of the problem, and learning about

stakeholder preferences and trade-offs (Herman et al., 2014). A collaborative deliberation process of discovering what is possible and desirable[7]. This conception fits with the recent economic theory insights that 'adaptive learning' is not spontaneous, while it plays an important role in real-time dynamics processes. Evans et al. (2018) show that the conditions required for an 'eductive coordination' are very stringent, so that there is little sense that spontaneous adaptive learning exists and leads to a stable coordination of expectations. The challenges inherent to defining and organizing 'qualitative' learning processes are important (Tsoukiàs, 2008). As suggested before, it requires institutional and governance innovation, which is another line of operational research (Marchau et al., 2019, Part 2). Again, the general movement is a shift in philosophy about the contribution of analysts: from trying to define the 'best' choice, to providing valuable information that enables collective deliberation and bargaining among the parties of the decision. The analysis of the competing 'narratives' also influences collective imagination and innovation (Beckert and Bronk, 2018).

(iii) The impossibility of identifying a reliable and deterministic plan from the outset requires that the initial design of a strategy should be updated over time; in response to how the future may actually unfold. Efficient adaptive planning should not only rest on the selection of an initial robust strategy. It should also make good use of new information and be sufficiency flexible to be adapted over time to a changing context. The DMDU approaches use the exploratory modeling to provide insights about which actions are best suited to which futures. It also provides information about the signals from the unfolding future to be monitored to ensure the timely implementation of the appropriate actions (Sowell, 2019).

[7] Massé reminded us a similar statement made about the general goal of the French Planning (1985): "to prepare a *desirable* future that appears *plausible* to the prospective minds and that becomes *probable* for a society committed to its realization" (Massé, 1991 [1965]: 24).

5. Planning and sustainable development: Two examples

Let us now briefly illustrate the challenges with two concrete applications: the design and choice of National Strategies against climate change and national carbon price systems.

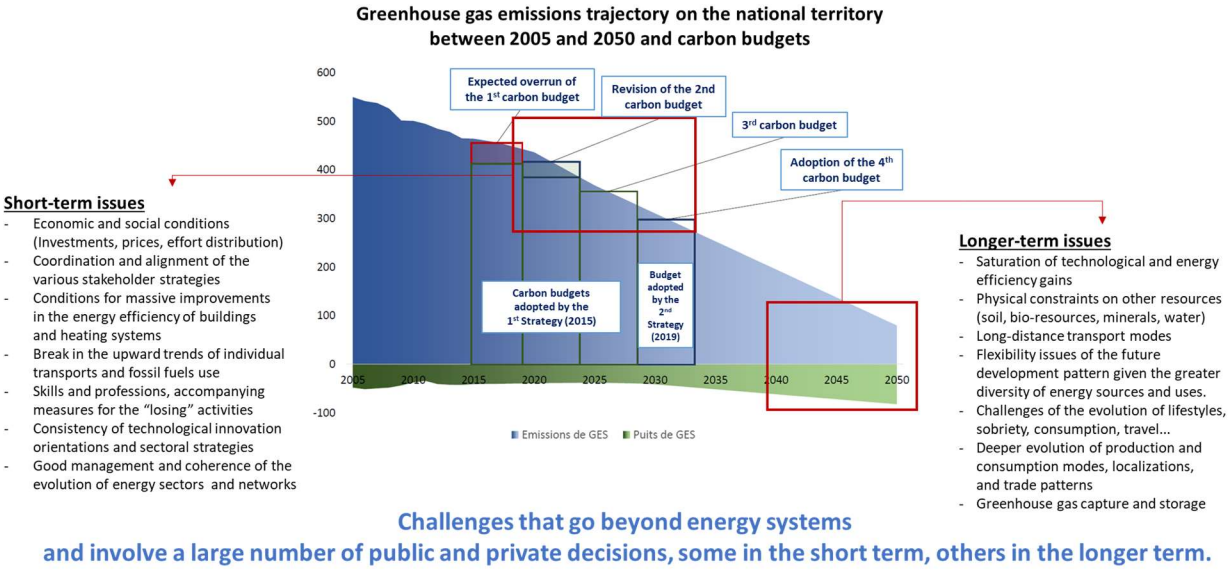
5.1 National Strategies against Climate Change

Following the Paris Agreement on climate change, countries agreed on a common framework for action. Countries agreed to build transparent national strategies to achieve the goal of zero net greenhouse gases emissions by the end of the XXIst century and to adapt to the future climate change impacts that are already occurring. As demonstrated by the last IPCC (2018) report, the objective of stabilising global temperature below +2°C above pre-industrial level requires profound transformations of development pathways. Choosing and realizing such development strategies is certainly an unprecedented decision-making and coordination problem, both in scope, magnitude, time dimension, and complexity.

As many other countries, France has started to put in place an institutional framework and an evaluation process, to discuss, define, and monitor its strategy. The 2015 law on the *Transition Energétique pour la Croissance Verte* (energy transition for green growth) set the institutional framework. Every five years, le Ministry for the Ecological and Inclusive Transition should carry out an analysis and consultation process in order to define the contours of the strategy. Descriptions of institutional frameworks and discussions about how to improve the governance of national climate strategies are available elsewhere (see Colombier, 2018; Rüdinguer et al. 2018). From my experience of the 2nd Low Carbon Strategy Process, which took place from spring 2016 to spring 2019, let me highlight three challenges for subsequent developments of the strategy and its effective implementation by the actors.

(i) A first challenge is to *sharpen the sequence of decisions and conditions of realisation.* The analysis of the strategy mobilise diverse expertise (mostly from engineers) to precise a vision of the technical and behavioural transformations required in each emitting sectors in order to achieve a national zero net emissions target by 2050 (transport, industry, agriculture and forest, residential and tertiary buildings, the energy sector, waste treatment, land use, carbon capture and storage). However, there is no clear description yet of the distribution of roles and the timing of concrete actions. A first task would be to sort and separate deliberations about short-term actions to which actors will commit, and long-term options that have to be kept open for future decisions and further examinations. Figure 1 illustrates this point with the various opinions issued during the institutional reviewing process of the government's draft Strategy. The issues listed concern challenges that go far beyond the narrow scope of energy and climate analysis and the mandate of the ministry in charge. Thirdly, the realisation of the Strategy requires not only 'public measures', but the alignment of numerous public and private strategies. While the framing of the scenario exploration was only to analyse and compare an 'existing measures scenario' with an 'additional measures scenario', corresponding to the narrow scope of a discussion on the public sector action and a statement of the government commitment to its policies.

Fig. 1 The French National Climate Strategy, sequence of decision and realization conditions



Sources: The French National Low Carbon Strategy 2, government's draft project (dec. 2018). Issues collected from various official opinions on the draft project: CNTE (The National Committee for the Ecological Transition), CESE (The Economic, Social and Environmental Council, AE (The Environmental Authority). Author's selection.

(ii) A second challenge is to *articulate multiple decision-making centres and processes around a common agenda*. The Impact Study of the draft Strategy enumerates about thirty different plans that have a direct impact on greenhouse gas emissions, but are discussed separately, with no overall articulation of agendas and decision processes. There is an overall issue of consistency and coordination, with sometimes no forum for discussing the trade-offs between competing objectives and identifying possible avenues for compromises. Beyond these closely related plans, other 'general policy' planning deliberations have significant impacts on the realisation of the strategy, and take place in parallel processes. This is the case for instance of the public finance programming, the local community planning, the European Long term Strategies, etc. Coherence between these decisions necessarily involves articulating the short and longer-term development goals and ensuring the economic and social conditions of the ecological transition. The decompartmentalization of the associated expertises is also an issue, as synergies and trade-offs cannot be examined in silos.

(iii) A third challenge is to *strengthen the Strategy adjustment mechanisms and its implementation procedures*. Progress along three pillars can help strengthening the national low-carbon strategy as a tool for dialogue, coordination and transition management; (1) Dialogue and coordination between institutions; (2) Cooperation on tools, expertise and evaluation; (3) Production of relevant information for those who are in charge of the decisions and/or the realisation of the strategy. Set up on a long term basis, a multi-institutions steering committee and complementary dialogue fora may help create room and time for exchanges about agendas, views, arguments and knowledge. As noted above, creating the conditions for well-organized deliberations should help to improve collective learning and the coordination of expectations. These conditions rarely pre-existing in the present complex world we live in, where decision-making processes, political positions and expertise are usually fragmented. Cooperation and real interdisciplinary discussions are needed to cover the large scope of the problem, make the best use of available knowledge, establish a clear 'state of the debates', and cross complementary views about the problem and its solutions. Finally, there is often a gap between the mental map of the Strategy that is constructed and modelled and the concrete realities on which the agents have control. Relevant information is needed to help them adapt and monitor their actions, while convincing them that the strategy is feasible, desirable, and that they have the means to act.

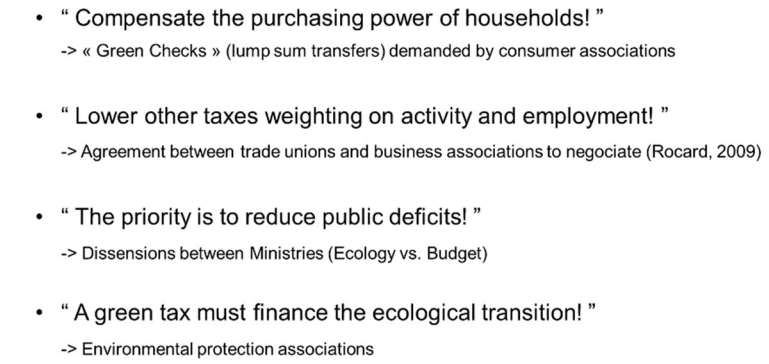
5.2 National carbon price systems

Our second example focuses on a related but more specific policy design issue. The implementation of carbon taxation is recommended in order to create an economic environment compatible with the objective of getting rid of fossil energies and CO_2 emissions. However, the numerous political failures to implement carbon taxes, or to reach

the required increase in carbon tax rates, have proven that finding a solid compromise about the details of its implementation is a tough problem. We have mentioned above that the economic analyses are inconclusive about the best design. In particular, the choice of how the tax revenue is used is essential for equity, efficiency and acceptability issues (Klener et al., 2018); While the best choice is sensitive to the inefficiencies of the initial situation and the assumed model of the economy. France has tempted to implement this policy four times with repeated political failures; the last protest started the recent 'yellow vests' movement.

With this second example, my purpose is to give a short illustration of 'deliberation by analysis' using exploratory modelling. The main objective of the approach is to clarify the sources of disagreements about the best revenue-recycling strategy. The analysis starts with the 'state of the debate'; here the competing stakeholders' arguments and positions about the best strategy (figure 2). Then, one particular stumbling block is analysed: the anticipated risk of negative short to medium term social impacts due to higher energy prices. A computable macroeconomic model – specially built to capture the main uncertain and debated parameter – is used to simulate a same unilateral carbon tax, but alternative revenue-recycling strategies (Combet et al. 2010). A static and 'uchronic' exploration is performed in order to abstract from complexities coming from additional dynamic management issues and competing beliefs about the future context.

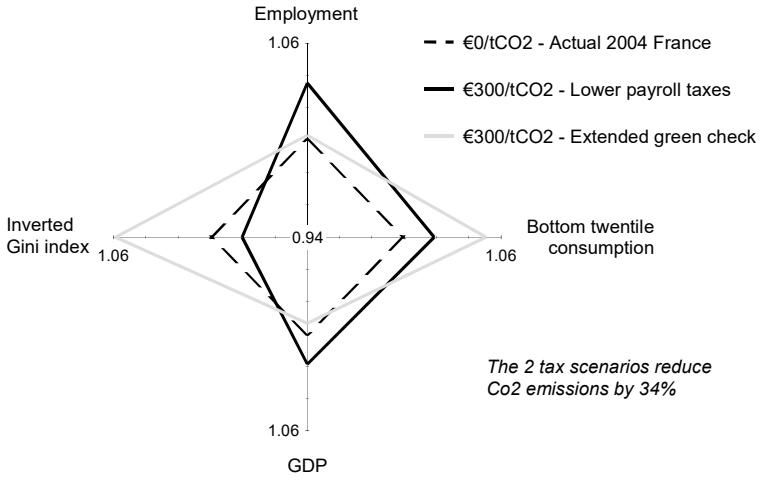
Fig. 2 Use of the carbon tax revenues: in need of consensus



Note: Observed after the Rocard Commission (Rocard, 2009) and during the 'Yellow Vest' protests (2019).

Figure 3 illustrates the trade-offs between two measures of distributional equity among households (an inverse Gini index for equality, and the consumption of the 5% poorest for poverty), and two measures of macroeconomic efficiency (GDP and aggregate employment). The diagram shows a trade-off between equity and efficiency. The strategy that finance a reduction of labour taxes benefits more to wages and the control of labour costs, and thus perform better on the macroeconomic dimension than a direct redistribution of the revenue through equal lump sum transfers ('carbon dividends'). However, this result has a cost in terms of increased inequalities. On the contrary, the equal carbon dividends option does not compensate for the higher energy costs in production and the higher prices weight on the purchasing power of households, the progression of wages and the level of employment. But there is room for compromises, and mixed recycling strategies can produce balanced results.

Fig. 3 The equity-efficiency tradeoff of a carbon tax reform



Source: Combet et al. (2010)

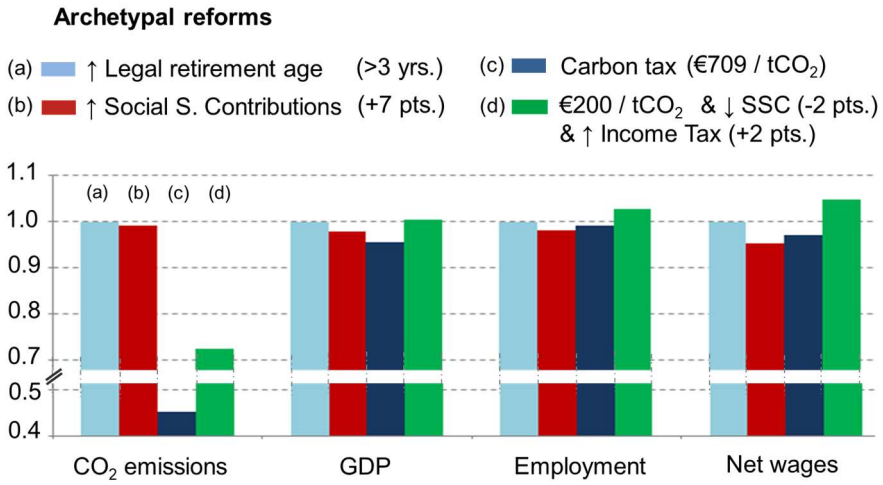
Note: The diagram visualizes the trade-off between two equity indicators (lower poverty on the right, more equality on the left) and two aggregate efficiency indicators (total employment at the top, total incomes (GDP) at the bottom). Variations of the consumption of the bottom twentile (poverty) and GDP are in real terms. The inverted Gini index (equality) is computed on consumption rather than income. Each indicator is normalized to one at the historical situation (dotted line). A same carbon tax and two polar revenue-recycling options are simulated and plotted. A same budget neutrality constraint is applied (a constant public deficits-to-GDP ratio).

Various sensitivity tests are carried out to analyse the robustness of the strategies ranking to various uncertain and debated parameter about the functioning of the economy (Combet, 2013): the real and nominal wage rigidities, the sensitivity of trade to domestic production costs ('price-competitiveness'), the price-elasticities of fossil energy consumptions, etc.

Others argue that a unilateral carbon price policy would not help in this period of sluggish growth and would therefore compromise other long-term socio-economic objectives, such as financing social protection systems, controlling public deficits and macroeconomic imbalances. Comprehensive analyses are useful in order to decompartmentalize these issues, discuss the nature of the trade-offs, and search for possible synergies. Figure 4 shows the simulated outcomes of four archetypal reforms aiming at funding the French pension system (Combet and hourcade, 2019). Each alternative

reform is evaluated on a same set of indicators. The analysis shows that neither the two classic reforms of the pension system, nor a carbon tax implemented to close the pension financing gap, perform better on most of the evaluation criteria than a comprehensive reform that sets a carbon tax at an appropriate level, uses its revenues to reduce the tax burden on labour and supplements financing needs with an increase in income tax.

Fig. 4 Comprehensive tax reform: exploring tradeoffs and potential synergies



Source: Combet and Hourcade (2019)

Note: The three reforms fund the pension system deficit over the period 2004-2020. Results are expressed relative to the 2020 situation in the higher retirement age scenario (a): "IRA > 3 years". In this scenario, the sole endogenous variable available for bridging the funding gap of the pension system is the legal retirement age. More than 3 years of postponement of the retirement age is required. In the other three scenarios, the legal retirement age is not increased (i.e. no change relative to the 2004 legal context). In the second scenario (b), the only adjusting variable available is the rate of social security contribution levied on salaries (with no distinction between the employees' and employers' rates). The mean rate of social security contributions increases by 7 percentage points (from 22.7% to 29.7% of net wages). In the third scenario (c), the only adjusting variable is the carbon tax. A rate of €709 per ton of CO_2 tax is required to bridge the funding gap. The fourth scenario (d) combines a carbon tax of €200 per ton of CO_2 whose revenue is used to reduce the rate of social security contributions SSC (a 7 percentage points cut, from 22.7% to 15.7%) and the remaining financing needs are met by an increase in income tax (a 2% increase is required, from 10.7% to 12.7%).

6. Conclusion

Through this selective journey among diverse economic research fields, I tried to document a common diagnosis. We have made progress in understanding the difficulties we are facing, as analysts, in dealing with real complex problems. Even if enormous advances in

analysis have been made, it is worth continuing to question the nature of analytical approaches that are feasible, relevant and useful in concrete decision-making contexts.

I showed that this question has not vanished despite the massive increase in technical and analytical power. As in many scientific fields, the development of economics models, mathematical formalisation and theorizing, improved data availability and statistical progress, have been tremendous. But these important advances have not fundamentally increased the human power to determine scientifically what is the 'best future'. Neither have they increased the power of conviction of economists about what is the best policy.

However, as pointed out by Chakravarty and Malinvaud – and as confirmed by the literature reviewed – there is room for improving both the relevance and the usefulness of the scientific contributions to real decision making. There is also room for modern Planning; not an instrument of dirigisme, a rigid, deterministic, discretionary, top-down, technocratic type of planning, but deliberative planning to better shape and coordinate collective action.

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