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# Scientific arguments in policy-making

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This paper focuses on the use of scientific insights for justifying decisions in policy-making. Because in policy-making the politician argues for a future course of action by pointing at its positive consequences, the burden of proof should concern not only the scientific arguments, but also the pragmatic arguments. We show how the political justificatory process takes place that combines the two argument types, and we propose criteria for assessing the quality of the justifications. Based on our theoretical findings, we provide a case-study analysis of the Paris Agreement on climate change in which we demonstrate how the politicians attempt to meet their burden of proof imposed by pragmatic and scientific argumentation.

**Keywords:** burden of proof, policy-making, pragmatic argumentation, scientific arguments

## 1. Introduction

In April 2009, an earthquake occurred in L'Aquila, Italy leaving behind 308 dead people. As a result of the catastrophe, six Italian scientists were sentenced to jail after being accused of negligence and giving false advice to the people of L'Aquila (Cartledge 2015). A few days before the earthquake, Bernardo De Bernardinis, a civil protection agency spokesman, gave an interview in which he explained that the situation posed no danger for the public, and that the scientific community had assured him that the situation was favorable because the continuous tremors meant a discharge of energy (Williams 2011).

This example illustrates one of the numerous cases in which politicians take scientific information into account when making decisions. Although this approach is considered necessary and desirable, there is no guarantee that the decisions will be correct. Making political decisions on problems where science has a say is difficult, because those problems can be described by science, but they are in principle unsolvable by it (Majone 1989: 3). One thing is to say how reality is,

but this rarely helps decide what to do with it. As Klabbers (2014: 82) illustratively explains, “even if experts say alcohol is bad for you, there is nonetheless a political trade-off to be made.” In almost all cases, politicians still have to make decisions, and in the best of the scenarios, they will listen to what the scientific community has to say.

A paradox seems to emerge out of this politics-science dynamic. One the one hand, the final decision is taken by the politicians, but on the other hand, the responsibility seems to be moved to the scientists because their opinion is crucial for the matter at hand (Millstone 2013). This situation is particularly problematic in public policy-making in order to establish political accountability. In this form of accountability, issues of who is responsible for what and especially who faces the consequences of the decision-making, commonly emerge (Schrefler 2014). In this vein, it is fundamental to pose the following question: What is the politicians’ burden of proof when they justify their decisions based on scientific insights?<sup>1</sup>

While this question may be answered based on legal, political, social and economic insights, in this paper we will focus on the burden of proof from an argumentative perspective. As Majone (1989) convincingly shows in his seminal book on the policy process, argumentation is the key component through which policy-makers arrive at judgments and decisions. After all, the scientific insights on which they base their final decision are expressed under the form of arguments supporting a position that a certain course of action needs to be followed. Despite its vital yet elusive role in political decision-making, little is known about the characteristics of the scientific argumentation in this context, let alone about how politicians (should) discharge their burden of proof associated with the arguments they advance.

This paper provides first an account of the relationship between science and decision-making and explains how we can distinguish and reconcile expertise and politics. Subsequently, we will examine the argument types which are commonly advanced by politicians when justifying their decisions based on scientific insights. The argument types will be described and analyzed by explaining the burden of proof that such arguments involve and how this can be effectively discharged. Finally, we will analyze a section of the Paris Agreement to illustrate how the burden of proof can be dealt with in instances of political accountability where

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1. In this paper, we use the term ‘scientific information/insights’ to refer to what Stone (2001:1) calls ‘research’ and Boswell (2008) terms ‘expert knowledge’: a codified, scholarly and professional mode of knowledge that has its prime institutional loci in universities, policy analysis units of government departments or international organizations, and private research institutes, and is produced by academics, experts, and development professionals. See also Klabbers (2014) who has a similar view.

scientific insights are taken into account to support a proposed measure. Given the complexity and transnational nature of global warming, policy-making on this issue strengthens the demand for relevant expertise. As a result, scientific knowledge is a central component in this process. For this reason, it is essential to obtain insights into how politicians justify their decisions on this particular issue and to establish how they discharge their burden of proof.

## 2. Science and political decision-making

Complex policy problems, ranging from consumer and environmental protection to economic governance, have always been analyzed and justified by politicians by reference to science. Particularly, political decisions on risky matters have often been legitimated by pointing at scientific evidence. For fear of uninformed decision-making, expert knowledge is commonly invoked in the case of unpopular or unfair decisions or decisions that turn out to be wrong or are contested (see also Hajer 2009). Science, as Maasen and Weingart (2005: 4) rightly point out, is “a necessary resource of policy-making even though it may be contested and open to interpretation in a specific case.” It helps to make decisions that keep the policy-makers in power based on the impression that the policies they propose are the right ones, if only because they are based on science. As Boswell (2008: 471) explains in her study on the political function of expert knowledge, scientific insights are a suitable means to “legitimize decisions and signal conformity to rational rules, underpinning the authority of policy-makers and their decisions”. Besides this legitimizing function, scientific insights have also a substantiating function (Boswell 2008: 472) in that they lend authority to particular policy positions. In fact, Boswell (2012: 7) also contends that the value of scientific insights resides in their legitimizing and substantiating functions, rather than exclusively or predominantly in their contribution to policy.

But although we take it for granted that science and politics are closely connected, how they are connected requires some explanation. Generally, four models are distinguished in which science has been incorporated into political decision-making, revealing a certain historical evolution of the relationship between expertise and politics. The first model, known as the ‘decisionist’ model, dating back to the late 19th century, stipulated that “policy-makers, i.e., elected representatives, should select and define goals and ‘ends’, while the role of bureaucrats and technical experts was to select and implement the appropriate means to achieving those ends” (Millstone 2013: 48, see also Heinrichs 2005: 44, see also Bromell 2017: 88). This relationship between science and decision-making, however, proved unrealistic, because in rapidly changing societies the benefits and

risks associated with the new technologies need to be based on scientific advice in order to set up relevant policy areas.<sup>2</sup>

This problem led to the development of the ‘technocratic’ model “encapsulated in the claim that policy should be based on, and only on, ‘sound science’” (Millstone 2013:50). In this model, scientific insights are recognized as crucial for the quality of policy-making and they are used to adjust policy-making to achieve desired political outcomes (see also Boswell 2012). Technical data is invoked in political debates and claimed to be enough for solving certain problems. The assumption that scientific considerations are necessary and also sufficient for political decision-making also proved its weaknesses, because scientific insights can be incomplete, unreliable, ambiguous, and even biased (see also Boswel 2012, Klabbers 2014). Although it may help to present controversial issues in depoliticized terms and avoid blame for controversial decisions (Millstone 2013:51), this model has been criticized for being vulnerable to mistakes (see Hertin et al. 2009).

A new model was subsequently developed that came to be known as the ‘Red Book’ model, from its publication by the US National Research Council in a red book (Millstone 2013:53). The model involves risk assessment being determined by scientific experts and risk management by policy-makers. Because the model involves scientists in identifying and selecting policy goals and policy-makers in selecting expert advisors, and the means to achieve those goals, which is the opposite relation to what usually takes place, the model is often seen as ‘bizarre’ (Millstone 2013:54). The discussions and evaluations by scientists do not operate in a policy vacuum, but are rather informed by assumptions derived from previous policies and the scientific community does not speak with one voice on every policy matter.

Finally, the ‘co-dynamic’ model acknowledges the policy context in which scientific judgments are made. Millstone (2013) explains that in this model it is not only scientific considerations that inform the choices made by scientists or only the evidence which they have at their disposal, but the type of evidence and the amount of evidence are framed by assumptions derived from previous policy-making.

Arguably, most often scientific insights are not used in political decision-making following just one strict model. Depending on the goal for which such insights are used, whether for multilateral agreements (see also Andresen 2014), in regulatory policy-making (see also Schrefler 2014) or policy debates (see also Klabbers 2014), to name just a few, elements from one model are combined with elements from another model in the final policy. Additionally, the type of

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2. This model has some features of the ‘knowledge-driven’ model and the ‘problem-solving’ model explained by Weiss (1979) in her paper on research utilization.

organization that takes a particular decision and its particular function determine the way in which scientific insights are used. Thus, an organization usually facing opposition to its policies will use scientific information as in the technocratic model only to a limited extent and it will complement it with additional resources to lend credibility to its views (Boswell 2008: 474). On the contrary, the technocratic approach will suffice when scientific insights are considered legitimate criteria for policy-making (Boswell 2008: 474). However, when there are big differences of values and preferences between the actor taking the decision and the public, scientific insights will be much less employed and their reliability is less important, because other arguments indicating popular support are more pertinent (see also Radaelli 1999). Such is the case, for instance, in policy areas such as immigration and the environment. What is clear is that scientific expertise, in one way or another, serves to provide arguments in alleviating or solving policy problems. Therefore, a question arises about the kind of arguments that are used by politicians in these cases.

### 3. The assessment of politicians' arguments based on science

Political decision-making needs justification and involves assuming responsibility for the course of action proposed. As elected or appointed bodies, those taking decisions are eventually responsible for the outcomes (Klabbers 2014: 85) and are politically accountable (Turner 2005: 115). The term 'accountability' has become particularly important in modern democracies. On the one hand, it is a way to keep the public informed while keeping governors under vigilance, and on the other hand, it is a way to bring to justice politicians and institutions for wrongdoings (Mulgan 2003).

Although there is neither a unique understanding of the concept of accountability nor a standard procedure to hold politicians to account for their actions, there are two aspects that are generally agreed upon (Andone 2015). The first one is that political accountability is valuable for modern democracies because it is a symptom of trustworthiness (Bovens 2006: 4). The second aspect is that, whenever political accountability takes place, politicians are in a situation where they have to argue for their decisions. In Bovens' words (2006: 9), political accountability is "a relationship between an actor and a forum, in which the actor has an obligation to explain and to justify his or her conduct, the forum can pose questions and pass judgment, and the actor may face consequences."

This last point indicates that argumentation is relevant, if not fundamental, in political accountability. When politicians are held accountable, it is not enough for them to provide justification for their decisions. The justification also has to be

regarded as reasonable by the account holder, which means that the justification has to be satisfactory according to certain standards. This emphasis on reasonableness makes argumentation theory an appropriate approach for the analysis and evaluation of politicians' justifications because in argumentation studies attention is paid not only to the way in which standpoints are justified, but also to the reasonableness of the justification.

Broadly speaking, politicians make use of arguments either to support a general determination ("Our country should welcome refugees") or to support a particular measure which is thought to be the *best* means for a certain predefined goal ("Carbon tax is the best way to reduce green gas house emissions"). Either way, these kinds of arguments can be analyzed by what is known in argumentation studies as 'pragmatic argumentation.' This type of argumentation portrays the justification process that takes place when a course of action is supported by pointing at its future consequences, either positive or negative. In practices of political accountability, pragmatic argumentation is important because "putting to the test the appropriateness of political actions [...] means basically testing the quality of pragmatic argumentation" (Andone 2015: 7). The following structure represents the positive version of pragmatic argumentation, as outlined in van Eemeren (2016: 17):

1. Action X should be carried out.
  - 1.1 Action X will lead to positive result Y.
  - (1.1)' Actions of the type X lead to positive results of the type Y.<sup>3</sup>

The appropriateness of pragmatic argumentation is judged on the basis of evaluation criteria derived from a number of 'critical questions' associated with this type of argument. Van Eemeren (2016) outlines three questions which can be asked to test the soundness of pragmatic argumentation:

- a. Do actions of type X lead to results of type Y?
- b. Is result Y really positive?
- c. Does action X have negative side-effects?

In this vein, an appropriate defense of a political decision has to show that the critical questions associated with pragmatic argumentation are answered adequately by politicians, in the sense that the answers provide an appropriate justification for the decision. The politicians' justification has to include at least three elements: the causal connection between the measures taken and the desired goals (to answer the first critical question), the desirability of those goals (to answer the

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3. See also Andone (2015) for a specification of these critical questions in European practices of political accountability.

second critical question) and the consideration of relevant side-effects (to answer the third critical question). Therefore, in practices of political accountability, an account-holder is entitled to pass a negative judgment on politicians when they fail to justify their decision in light of the critical questions. That is the case, for example, when a course of action is futile to achieve a certain goal, when the goal is not in the interests of society, or when there are undesirable side effects that make the decision not worth taking. It is important to notice that a single failure in one of the three elements of the justification is enough to pass a negative judgment on politicians.

However, when scientific information is invoked by politicians to support a proposed course of action, pragmatic argumentation is complemented by a different type of argument known as argument from authority (van Eemeren and Grootendorst 1992), which carries its own probative weight in the final decision-making. The structure of arguments from authority can be represented along the following lines:

1. Statement X is true.
  - 1.1 Expert Y endorses statement X.
  - (1.1)' Experts endorsing statements from their relevant field is symptomatic of the truth of those statements.

Arguments based on authority bring with them a layer of critical questions that adds to the critical questions associated with pragmatic argumentation. These additional questions help to determine whether the appeal to the authority is pertinent and sufficient or not. The questions applying to arguments from authority are fundamentally different from the questions applying to pragmatic argumentation, because they establish the acceptability of statements based on the authority of an expert in a particular field and are not related to the consequences of a course of action, as in the case of pragmatic argumentation. We formulate these critical questions for authority arguments in the following way:

- a. Is Y's expertise relevant for the propositional content of statement X?
- b. Are Y's personal interests affected by regarding statement X as false?
- c. Are there other relevant experts who do not endorse statement X? If yes:
  - i. Does Y's record in the field provide reasonable confidence to assume that Y's judgment concerning statement X is right?
  - ii. Is there an expert in the field whose authority is recognized by the rest of the expert community? If so, does she or he endorse statement X? If not, does the majority of experts endorse statement X?

These critical questions aim to prove the adequacy of the justification of authority arguments when used by politicians. Question (a) checks whether the expertise of an authority is relevant for the matter under discussion or not. This point is important because policy-makers can face complex problems that require experts from different fields and it is necessary to make clear how the expertise of an authority is relevant for the problem at hand. Question (b) ponders the reliability of the expert. If there are reasons to believe that the impartiality of the expert is compromised, then his/her judgment cannot be taken as providing sound justification for a statement. Question (c) is more complex. Instead of inquiring about the expert's reliability, the question ponders the reliability of the policy-maker when choosing experts. It could be the case that a policy-maker is not choosing an advisor in view of its expertise but in view of the expert endorsing certain points of view. For this reason, it is important to consider the opinion of other experts that may differ from the opinion of the chosen expert. If there is a consensus among experts, then it would make no difference which expert is chosen. But if there is disagreement, then politicians would have to show that the chosen expert has been selected in view of his/her competence and not for any other reason, which is the purpose of question (c.i). As Goldman (2001:106) argues, past track records are a reliable way to assess the likeliness of an expert having the correct answer in a current situation. On the other hand, question (c.ii) obliges politicians to briefly explore the expert community from the field they are in need of advice. This is the reason to seek for an expert whose authority is recognized within a certain field and also to inquire for the general opinion of the expert community.

Abuses and misuses of this argument type occur, for instance, when the propositional content of the argument from authority is called into question, as when someone lacks expertise in a certain discipline but claims to have it (see also Cummings 2010:169). The same occurs when the justificatory force of the argument at issue is called into question, as when the fact that the opinion has been put forward by an expert in the relevant field indeed renders the opinion acceptable (Klabbers 2014). Whether the expert has voiced his opinion primarily from his own expertise and not from his personal interest, whether the expert is able to defend his opinion in a way different from referring to his expertise and whether experts in the same field agree as to the acceptability of the opinion expressed in the standpoint, are all important issues to take into account in judging the acceptability of the authority argument (Snoeck Henkemans and Wagemans 2012:348). Because each argument type, pragmatic and authority argumentation, is associated with different critical questions, all of these questions need to be dealt with when politicians invoke scientific information. Therefore, the political justification becomes more complex, because more, and qualitatively different critical questions, need to be answered.

Our view of appeals to authority in which we argue for the evaluation of this type of argument differs from those pointing out that expertise should be altogether dismissed because it is by definition fallacious (see also Walton 1997 providing an overview of such approaches), and need not be further evaluated. In this view, appeals to expertise involves subjective elements based on opinions and judgments of individuals who cannot deliver objective knowledge claims. Yet Cummings (2010:170) explains that “to the extent that appeals to authority are fallacious in scientific inquiry, their fallaciousness should not reside in the *mere fact* that expert testimony is being used but, rather, in the fact that the *quality* of that testimony can be called into question” (original italics). Moreover, if such appeals are by definition problematic, why would an appeal to scientific sources be made in political decision-making to legitimize policies? Often, as Cummings (2010:172) demonstrates in the famous case of the mad cow disease in Great Britain, appeals to scientific insights are the best and sometimes the only way to proceed to formulate policies for dealing with a certain problem.

Arguments from authority emerge in political decision-making as a way to justify the causal relation between a course of action that it is being proposed and a desired goal. Therefore, politicians rely on scientific information to take for granted the consequences they are considering. Instead of directly arguing for why the goal will be obtained by means of their decision, politicians bring the scientists’ expertise to cover this point. In this way, scientific knowledge is linked to the first critical question of pragmatic argumentation because this particular question checks for the causal relation present in this type of reasoning (actions of the type X lead to results of the type Y). In the best of the scenarios, the scientific reference will function as a warrant for the factual claim, but making reference to scientific knowledge is not enough by itself. The appropriateness of the scientific source is still to be proven, and that is the function of the critical questions of arguments from authority. Without a complete defense, the reference to the scientific authority will be inappropriate, and consequently, the first critical question of pragmatic argumentation would remain unanswered satisfactorily.

Apart from that, it is important to notice that scientific knowledge does nothing to answer the remaining critical questions of pragmatic argumentation. From a rhetorical point of view, it can be very persuasive to bring a scientist’s authority to support a course of action, not only to back up the empirical claims, but also to suggest its desirability. Given the positive status of science in society, the appeal to scientific knowledge can be used to suggest that a particular course of action is already adequate because it takes scientific information into account (Klabbers 2014). However, as it has been mentioned before, empirical claims are not enough by themselves to justify a course of action. There could be a complete description of the world, but such a description would be insufficient by itself to define

people's preferences. Thus, politicians cannot appeal only to science to determine whether a given goal is desirable for society and they still have to justify their decision on prescriptive grounds.

As it is, politicians cannot escape their probative obligation to provide an answer to the other critical questions of pragmatic argumentation. Politicians still have to justify their decisions by showing that the consequences that are being pursued are indeed desirable for society and that the prejudicial side-effects of their decision are also being considered. Without these two last points, the overall justification will be unsuccessful, no matter how much scientific information is taken into account. Therefore, from an argumentative point of view, the politicians' responsibility is not discharged by making reference to scientific information. On the contrary, their obligation increases because there are more critical questions that require a satisfactory answer if they make use of arguments from authority. These arguments are useful because they allow politicians to answer one of the critical questions of pragmatic argumentation, but they come at the price of acquiring new critical questions related to the scientist's authority.

Particularly in risk policies, justifications turn out to be even more complex, because opinions on such topics tend to polarize the scientific community. If we take the case of global warming, the debate can be divided between those scientists that support the idea that human activities are the direct cause of global warming (which is the vast majority of the scientific community) and the scientists who defend that global warming is a phenomenon that would be occurring independently of any human activity because it is driven by cyclic natural variations (e.g., Alexander and Bailey 2007). Therefore, the scientific information that is available could be used by politicians to support completely different courses of action.

This polarization of opinions regarding the causes of global warming poses additional problems into politics. Since global warming is seen as a threat to modern societies, politicians are forced to make a decision on the issue no matter their political orientation or agenda. The crux of the dilemma is that if global warming is caused by human activity, part of the solution would be to stop the activities that generate the threat at the cost of decelerating the economy, because many industries would be affected and expected profits would be lost. This disadvantage would not be significant if the threat that global warming poses were overcome because the price of not doing anything would be even higher. However, if global warming were not caused by human activity, taking those measures would be inappropriate because they would do nothing to prevent global warming and the economy would be harmed as a result of limiting several industries. Therefore, from this perspective, the result would be having a weaker economy to face the challenges of global warming.

Part of the difficulty in risk policies is that politicians are forced to take a decision on a problem where scientific information has to be taken into account, but the information available is such that it brings uncertainty to the resolution of the problem. In this context, the use of arguments from authority is pushed to its limits because the justification not only has to show that the appeal to authority is adequate, but also that additional means have been considered in order to favor one scientific community over others (see also Cummings 2010; Maasen and Weingart 2005). In regular circumstances, where agreement among experts is well established, it is enough to show that the expertise of an authority is relevant for the matter at hand. But in circumstances where the scientific community is clearly divided, it is useless to show that a scientist is an expert in the field, because there are other scientists whose expertise is just as pertinent for the discussion, but their opinions are contradictory. This is why further justification for selecting one community of experts over the other is indispensable.

#### 4. The case of the Paris Agreement on climate change

The Paris Agreement was issued by the United Nations Framework Convention on Climate Change (UNFCCC), which is an international treaty for cooperation on the challenges posed by global warming. The main aim of the convention is to coordinate international efforts to prevent and manage the negative consequences of climate change. In order for the Paris Agreement to have binding force, the parties of the UNFCCC have to ratify it. The parties of the convention are divided into different groups depending on their particular circumstances and economic development,<sup>4</sup> but every ratifying party shares the responsibility for preventing climate change. The measures considered in the Paris Agreement vary from reducing greenhouse gases emissions to developing new technology, but all measures are meant to achieve the main goal of the agreement: strengthening the global response to the threat of climate change (United Nations 2016: 3).

The Paris Agreement is the result of the interaction of different bodies. On one side, there is the convention itself (UNFCCC), which tries to bring about policies to attend global warming. On another side, there are the policy-makers, represented by the parties of the convention. Additionally, there is the scientific community, among which the Intergovernmental Panel on Climate Change (IPCC) stands out because it is regarded as “the ultimate authority for providing the best [...] assessment of current scientific knowledge for the purpose of climate

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4. Developed nations have different commitments compared to the commitments of undeveloped nations. (United nations 2016: Article 3).

policy-making” (Fischlin 2017: 8). Basically, the UNFCCC brings together policy-makers with members of the scientific community for the purpose of dealing with global warming. In this line of thought, the measures of the agreement are meant to be instrumental in achieving the ultimate goal of the convention, but in order for those measures to be successful, they have to be grounded in adequate information, which is supposed to be provided by the scientific community.

The IPCC is an international body for the assessment of scientific and technical information regarding climate change. Although the IPCC does not conduct any research by itself and has no saying on policy-making, its role in the delivery of the Paris Agreement was fundamental, because the IPCC assesses diverse scientific evidence on the topic, and then it prepares reports where the best information available is presented. These reports are organized in such a way that they can easily be understood by policy-makers.<sup>5</sup> In this sense, the work of the IPCC helps to bridge the gap between science and policy-making.

The IPCC is divided into three working groups, each of them with different tasks. The first group deals with the physical causes of climate change, the second group deals with its consequences, and the third group works on the measures that have to be taken in order to prevent and fix the negative consequences of climate change. This division of labor can also be seen in the structure of the Paris Agreement because there are measures to attend the physical causes of global warming, other measures to identify negative consequences, and also measures to confront unavoidable harms. Consequently, the Paris Agreement is an example where scientific information sets the topics of the political agenda, because of the relevance of the information for human well-being. However, the role of scientists is not to take decisions, but only to provide policy-makers with the best information available.

Given its legalistic style – where certain decision are presented one after the other without necessarily indicating relations of justification or dependence – the Paris Agreement is not a typical example of an argumentative text. However, the Agreement can be argumentatively analyzed because it is the result of an argumentative process that gave shape to its content, and therefore, an argumentative analysis can provide insights into the adequacy of the measures in view of their justification. By using the structure of pragmatic and authority argumentation as analytical tools, and the information present in the Agreement and related sources, it is possible to reconstruct the Agreement as a series of arguments to which the associated critical questions can be applied. Both the argumentation

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5. The IPCC publishes reports specifically meant for policy-makers when adopting measures regarding climate change. Available at [http://www.ipcc.ch/publications\\_and\\_data/publications\\_and\\_data.shtml](http://www.ipcc.ch/publications_and_data/publications_and_data.shtml).

and the answers to its critical questions enable us to determine how the burden of proof can be dealt with. For reasons of space, the analysis cannot cover the whole document, but a partial analysis is enough to illustrate how science and policy-making intertwine for the justification of the measures in the Paris Agreement.

The rationale of the agreement is expressed in the preface of the document, where it is mentioned that its measures are instrumental in resolving the threats posed by climate change. The overall structure of the Agreement matches the structure of pragmatic argumentation and it can be represented schematically in the following way:

1. UNFCCC parties should endorse the measures in the Paris Agreement
  - 1.1 Endorsing the measures in the Paris Agreement will lead to strengthening the global response to the threat of climate change (Art. 2)
  - (1.1)' Measures as those prescribed in the Paris Agreement lead to stopping climate change and enhancing the capacity to face its consequences

The main objective of the UFCCC is stated in the art. 2 of the Agreement “[strengthening] the global response to the threat of climate change” (United Nations 2016). Given the generality of the goal, there are further specifications of what it means to strengthen the response to climate change. These specifications are important because they allow relating each measure of the Agreement with at least one of the specifications of the main objective. For example, one of the specifications is that climate resilience must be fostered. With this specification at hand, the measures in Art. 5, which is about the conservation of reservoirs of greenhouse gases, can be fully reconstructed argumentatively along the following lines:

1. UNFCCC parties should conserve and enhance forests (Art. 5 Section 1)
  - 1.1 Conserving and enhancing forests will lead to fostering climate resilience (Art. 2 Section 1 point (b))
  - (1.1)' Conserving and enhancing forests lead to enabling the environment to recover from the disturbances of climate change
    - ((1.1)'.1) The IPCC affirms that conserving and enhancing forests enable the environment to recover from the disturbances of climate change (IPCC 2014: 28)
    - ((((1.1)'.1)')' The IPCC endorsing statements about climate change is symptomatic of the truth of those statements

This reconstruction reproduces a pragmatic argument with its bridging premise (1.1)' being supported by an argument from authority. This combined structure is prototypical of the arguments that politicians use when justifying a political decision based on scientific information, because the scientific source is used to back up the measure at hand. The same pattern can be reconstructed from

various passages of the Agreement because its measures depend on having scientific insights. However, in order to determine how politicians discharge their burden of proof, the answers to the critical questions of both pragmatic and authority arguments have to be analyzed. In the example at hand, this cannot be empirically determined simply because there have not been any instances of political accountability related to climate change. However, it is still possible to analyze the justification that could take place in such a circumstance in light of the available information present in the Paris Agreement and other sources related to it.

As mentioned before, when politicians rely on scientific information, the first critical question of pragmatic argumentation is granted by means of the scientific source, but at the expense of having to answer the critical questions of arguments from authority. Therefore, a satisfactory defense of all the critical questions of the argument from authority counts as an adequate answer for the first critical question of the pragmatic argumentation. In this example, the IPCC is invoked as the scientific authority to grant that forests enable the environment to recover from the disturbances of climate change. Consequently, the politicians' burden of proof should address the appropriateness of the IPCC as a scientific source.

In this example, the first critical question of authority arguments concerns the pertinence of the IPCC for the matter of climate resilience. This question could be answered adequately because in the Paris Agreement it is recognized that its measures should be based on "the best available scientific knowledge" (United Nations 2016:1) and in article 21.2 of the constitutive document of the UNFCCC it is specified that it "will cooperate closely with the Intergovernmental Panel on Climate Change (United Nations 1992). Given that the IPCC is regarded as the most important scientific authority on climate change (Fischlin 2017; Litfin 2000) and the discussion is about climate resilience, which is a key component of managing the impacts of climate change, the pertinence of the authority of the IPCC is appropriate for the discussion.

The second critical question of authority arguments is about conflicts of interest. Although there is no explicit information about the impartiality of the IPCC in the Paris Agreement, it is possible to find information about the objectivity and transparency of their work in open-access Appendixes (see IPCC 2013, 2011) where their procedures and financial matters are open to public scrutiny. Given that the moral integrity of the organism is available for scrutiny, the IPCC can be regarded as not having conflicts of interest until there are reasons to doubt the quality or motives of their work. In this way, the second critical question could be answered adequately in an instance of political accountability by making use of such information. Lastly, the third critical question of authority arguments ponders on the opinion of other relevant experts who may contradict the opinion of the appealed authority. This question might seem difficult to apply in the case

of the IPCC because it is a meta-scientific institution whose work partially consists of solving those kinds of scientific controversies regarding climate change. Whenever there are conflicting results between scientists, the IPCC evaluates the information to settle the question in favor of one of the parties. Thus, the opinion of the IPCC implies somehow that the scientific disputes have been resolved in a certain way. However, it would still be possible to pose the third critical question in this case by comparing the opinions of the IPCC with other scientific institutions with a similar standing, like the American Association for the Advancement of Science (AAAS). In such cases, it would be easy to establish the correspondence between the opinions of both organizations because they agree about the causes of climate change and its implications for the well-being of mankind. Therefore, it would also be possible to answer adequately the third critical question of authority arguments. Given that the three critical questions of authority argumentation were answered successfully, the first critical question of pragmatic argumentation would have been defended successfully if the UNFCCC were justifying the appropriateness of the decision of conserving and enhancing forests.

A complete analysis of the burden of proof has to consider also the remaining two critical questions of pragmatic argumentation. The second critical question of pragmatic argumentation asks whether the goal being pursued by the measure is really positive. Since the goal of conserving and enhancing forests is to foster climate resilience, it has to be shown that climate resilience is something positive, but for that matter, it has to be noticed that climate resilience implies avoiding a wide variety of catastrophes (AAAS 2014: 4–8) which are very likely to occur if the current *status quo* is maintained. Consequently, the prevention of those negative scenarios is a positive payoff of fostering climate resilience. Those risks are well known by the UNFCCC because one of its mechanisms, the Warsaw International Mechanism for Loss and Damage (WIMLD), is meant to advert the negative consequences of climate change. This point is covered in Art. 8 of the Paris Agreement where, among other things, it is established that the WIMLD has to enhance the understanding of the effects of climate change. Therefore, the concerns of the second critical question of pragmatic argumentation are dealt with in the Agreement.

The last critical question of pragmatic argumentation refers to the possible undesirable side-effects of the proposed measures. In the preamble of the Paris Agreement, this point is explicitly addressed when recognizing that “Parties may be affected not only by climate change, but also by the impacts of the measures taken in response to it” (United Nations 2016:1), and for that reason, it is established that the measures should be implemented while taking into account the needs and the special situation of undeveloped nations, so the measures of the agreement do not pose an obstacle for the eradication of poverty, safeguarding food security and preservation of the rights of indigenous people, local

communities, migrants, children and people in vulnerable situations. For all these reasons, it is clear that the measures of the Paris Agreement take into consideration the possible side-effects of its measures, and therefore, this critical question is also dealt with appropriately.

This analysis shows that it would be possible for UNFCCC to discharge its burden of proof adequately because all the critical questions of pragmatic and authority argumentation can be answered successfully. This analysis highlights the elements that must be accounted for in a practice of political accountability and the terms in which they can be accounted for. The politicians' burden of proof can be analyzed by means of critical questions because a satisfactory answer to those questions imply that politician's decisions were reasonably justified. Contrarily to that, inadequate answers to these critical questions can be a clear sign of imprudence by politicians when taking a decision and they must be held responsible in those cases.

## 5. Concluding remarks

The common use and fundamental importance of scientific information in current political decision-making require a proper understanding because those insights are used to justify different policies. In our own account, we have examined the structure and quality of pragmatic arguments and arguments from authority, and have focused particularly on their consequences for the politician's burden of proof. It is of utmost pertinence and urgency to understand the argumentative obligations which politicians assume in policy-making when they resort to scientific information, as well as to assess whether such obligations are properly met, in which circumstances this occurs, and why. By delving closely into the case of the Paris Agreement on climate change, which has been issued based on an impressive number of scientific information, we have explained how the enactor of this instrument fulfills its burden of proof. A more extensive analysis of this document, including other aspects than those on which we focused in this paper, could reveal other aspects which require further investigation.

Our own argumentative account sets the scene for deeper research into the political, legal and social consequences of not meeting probative obligations when policies are adopted. Our own results explain the argumentative quintessence of scientific reasons in policy-making, yet further research is required that provides a multi-disciplinary understanding of such reasons. For this purpose, specific policy areas need to be examined, as well as specific types of policies, each of which has its own specificities and imposes constraints on the way in which scientific insights can be invoked in policy-making.

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