

Manchester Journal of International Economic Law

Volume 15

September 2018

Issue 2

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The Case for an Innovation Principle: A Comparative Law and Economics Analysis

Aurelien Portuese* & Julien Pillot†

ABSTRACT: *After the rise of the precautionary principle (or approach) in the late 1990s in a number of jurisdictions, the economic consequences of this newly created principle of law have unfolded. Such consequences were either acclaimed – for providing a minimisation of a number of externalities – or lambasted – for providing justificatory grounds for the prohibition of potentially propitious innovations due to the existence of scientific uncertainties.*

Whereas innovation has increasingly become of salient importance in today's economies, European economies face sluggish economic growth rates partly caused by a regulatory framework where risk-aversion is incentivized. The precautionary principle induces and favours risk-aversion at the expense of innovation.

This Article discusses the law and economic foundations and implications of the precautionary principle in the WTO, the European Union, France and the United Kingdom. Having introduced the importance of law in stifling innovation and discussed the current precautionary principle, this Article vouches for an innovation principle to come to the fore in order to counterbalance the innovation-costly precautionary principle. A number of recommendations are proposed at the end of the article.

1. INTRODUCTION: INNOVATION SHALL STEM FROM LAW

Economic efficiency is commonly approached from three different angles: allocative efficiency, productive efficiency, and dynamic efficiency. Allocation efficiency is attained whenever the equilibrium reached allocates each economic resource to those who value them the most: economic optimality is obtained thanks to a minimisation of transaction costs amongst economic actors, and thereof, social welfare is being maximised. Social welfare comprises both consumer welfare (the difference between the willingness to pay and the purchasing price) and producer welfare (the difference between the willingness to sell and the selling price). On the

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other hand, productive efficiency means that equilibrium is reached whenever it becomes impossible to produce the same number outputs if the inputs are reduced, or alternatively, whenever it becomes impossible to more outputs with the same number of inputs.

Finally, dynamic efficiency¹ refers to considerations for optimising future social welfares in a longer-term. Dynamic efficiency deals with optimal incentives for economic actors so that they are incentivized to use the available resources in an efficiency manner in a long term through the development of technological progress and innovations. Dynamic efficiency not only ensures that innovation can take place, but does also allow for allocative and productive efficiencies to be reached in long-term new social settings.²

But, dynamic efficiency is fostered (or stifled) by legal and institutional rules.³ The strength of protection of intellectual property rights and patents, the strong enforcement of contracts and the ability to ensure that innovators are paid off are amongst the elements that allow for an institutional and legal environment to foster innovation.⁴ Therefore, innovation can, and must be, fostered by Law. Indeed, the quality of law – or more precisely its economic efficiency – increase economic performances of current economic actors but also stems the seeds for disruptive innovation and its *disrupters*. Disrupters can be defined as innovative entrepreneurs capable of profoundly (and suddenly) modifying the nature and quality of the goods and services offered in a relevant market.

Countries with inefficient legal systems encounter sluggish economic growth rates whereas countries that have adopted institutional reforms can reap off the benefits of higher economic growth rates, hence a heightened level of innovation.⁵ But how to define innovation? Innovation is this practical invention – of a good, service or methodological approach⁶ –

¹ Also called ‘innovation efficiency’ as suggested by competition law professor Joseph Brodley. See Joseph Broadley, ‘The Economic Goals of Antitrust: Efficiency, Consumer Welfare and Technological Progress’, *New York University Law Review*, 1987, 62: 1020-53.

² Brodley argues that dynamic efficiency is the most important of the three types of efficiencies because ‘it provides the greatest enhancement of social wealth, followed by production efficiency with allocative efficiency – the main focus on current enforcement efforts – ranking last’, in Joseph Brodley. See Broadley (1987), *supra* note 1, at 1026.

³ This relationship is evidenced notably by D. C. North and R. P. Thomas, *The Rise of the Western World: A New Economic History* (Cambridge University Press, 1973). See also C. Freeman and L. Soete, *The Economics of Industrial Innovation* (London: Pinter, 1997); D. Rodrik, ‘Institutions for High-Quality Growth: What They Are and How to Acquire Them’, *NBER Working Paper*, 2000; D. Rodrik, *In Search of Prosperity. Analytic Narratives on Economic Growth* (New Jersey: Princeton University Press, 2003) ; E. L. Glaeser, R. La Porta, F. Lopes-de-Silanes and A. Shleifer, ‘Do Institutions Cause Growth?’, *Journal of Economic Growth*, 2004, 9(1): 1367-401; D. Acemoglu, ‘Institutions as Fundamental Cause of Long-Run Growth’, in P. Aghion and S. Durlauf (eds.), *Handbook of Economic Growth*. (North Holland: Elsevier, 2005), Chapter 6.

⁴ See T. Nicholas ‘What Drives Innovation?’, *Antitrust Law Journal*, 2011, 77: 787-809, at 788, who lists the institutional causes to innovation such as ‘intellectual property institutions, the supply side of innovation, and the financing of technological development’, ‘the nature of commercialization environments and market structure dynamics’.

⁵ See R. Barro, ‘Determinants of Democracy’, *Journal of Political Economy*, 1999, 107(S6):158-83 ; S. Knack, and P. Keefer, ‘Cross-Country Tests Using Alternative Institutional Measures’, *Economics and Politics*, 1985, 7(3): 207-27 ; R. Porta, F. Lopes-de-Silanes, A. Shleifer and R. Vishny, ‘The Quality of Government’, *Journal of Law, Economics & Organization*, 1999, 15(1): 222-79.

⁶ EPSC, ‘Towards an Innovation Principle for Better Regulation’, EPSC Strategic Notes. Issue 14, 2016, where innovation is defined

by two elements. The first introduces the aspect of novelty: innovation is a new idea in relation to something that is established. This idea must find its way from theory to practice. As such innovation does not only relate to technical or scientific novelties, but may also pertain to processes and organisational change across sectors. The second contains a teleological criterion: a technical novelty or a new approach can only be regarded as innovative if it brings economic

spawned by an entrepreneur⁷ who has engaged into risk-taking activity by allocating some of her time, money, and knowledge in the delivery of an undiscovered good or service or in the use of a never-adopted methodological approach. Therefore, it is a prerequisite that the innovator be *risk-taking* or *risk-lover* in order for innovation to occur. Hence, the legal and institutional setting must ensure that risk-taking is encouraged rather than stifled, is bolstered rather than tamed: risk aversion must consequently be minimised.

The legal rules are not best incentivizing innovation, in the European Union (EU), the UK and France as illustrated and discussed below. The World Trade Organisation (WTO) shall also be compared. On the contrary, risk aversion, as a legal framework is favoured during the last few years. Risk aversion is embodied within our legal orders by a general principle of law – the precautionary principle. This principle, based on loadable premises,⁸ relies upon risk aversion as paradigmatic basis for legal design. This principle, however, creates great innovation costs in the emerging digital and innovation economies.

Henceforth, a telling opposition surfaces between the requirement of an innovation-friendly legal environment and its corollary prerequisite – namely risk-loving – and the requirement not to violate the current general principle of law which is the precautionary principle and its risk-aversion underpinning philosophy. How to reconcile those contradictory objectives – i.e. the innovation principle together with the precautionary principle? More particularly, how to reach an economic optimum of risk-neutrality when entrepreneurs embark into innovation? Must there be a balancing exercise by regulatory authorities and judiciaries of the precautionary principle with an opposite objective? Would the recognition of a general principle of innovation in our legal orders and its risk-loving philosophy in order to attain a reasonable risk-neutrality be desirable both from an economic and legal perspective?

This Article intends to review the EU, UK and French laws with respect to the precautionary principle (part 2). Ultimately, this Report shall propose the introduction to the so-called *innovation principle* in the respective French and UK legal orders so that risk-neutrality for entrepreneurs is optimally incentivized (part 3). We shall then conclude this Article (part 4).

and societal benefits. Against this backdrop, an innovation is to be understood as a process through which the novelty has to win social recognition and acceptance over time.

⁷ On social determinants of the inventor, see P. Aghion, U. Akcigit, A. Hyytinen and O. Toivanen, 'The Social Origins of Inventors', *NBER Working Paper*, No. 24110, Issued December 2017, DOI : 10.3386/w24110.

⁸ C. Sunstein, 'Beyond the Precautionary Principle', *University of Pennsylvania Law Review*, 2003, 151: 1003-58, at 1004-5, who convincingly criticizes the precautionary principle even if he acknowledges that its objectives pursued (such as environmental protection, and health protection) are desirable but should be attained directly with public policies rather than indirectly with the precautionary principle.

2. THE PRECAUTIONARY PRINCIPLE: A COSTLY RISK-AVERSION

General principle of law, decision-making norm when scientific uncertainties arise,⁹ ‘a magic spell’ principle¹⁰ encouraging ‘obscurantism’,¹¹ the precautionary principle hacks back from a shared fear amongst decision-makers of a catastrophe involving health, environmental, or social issues (1). ‘Ill-defined’, the precautionary principle enjoys a ‘philosophical reputation [that] is low’.¹² Nevertheless, the ethical objectives of the precautionary principle¹³ do not preclude the precautionary principle to be a legal principle with detrimental economic consequences with respect to innovation and investments (2).

2.1. Origins

Originating from a legitimate objective to tackle environmental pollutions at global scale, the precautionary principle represents this post-modern law in which law, morality and politics are arguably intertwined¹⁴. The first textual reference to the precautionary principle hacks back to the Global Charter on Nature, in 1982, which states that

activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature, and where potential adverse effects are not fully understood, the activities should not proceed (para. 11 b).

Also, the word *precaution* is explicitly referred to in the Ministerial Declaration of 1987 following the Second Global Conference on the North Sea Protection wherein it is stated that:

call upon the North Sea Ministers to apply the Precautionary Principle in the further development of the strategy to combat the eutrophication in the North Sea and to give impulses to the application of the source oriented approach (para. VII).

The Second North Sea Conference Ministerial Declaration (*London Declaration*)¹⁵ explicitly referred to the principle three times,

in order to protect the North Sea from possibly damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence;

⁹ D. Resnik, ‘Is the Precautionary Principle Unscientific?’, *Studies in History and Philosophy of Biological and Biomedical Sciences*, 2003, 34: 329-34, at 330.

¹⁰ P. Kourilsky and G. Viney, ‘Le Principe de Précaution. Rapport au Premier Ministre’, *Odile Jacob : Documentation Française*, 15 Octobre 1999, available at : www.ladocumentationfrancaise.fr/var/storage/rapports-publics/004000402.pdf (accessed?); see more generally P. Sandin, ‘Dimensions of the Precautionary Principle’, *Human Ecological Risk Assessment*, 1999, 5: 889-907.

¹¹ C. Birraux and J-Y Le Déaut, (2012) ‘L’Innovation à l’Épreuve des Peurs et des Risques’, Rapport déposé à l’Assemblée Nationale et au Sénat le 24 janvier 2012, Office Parlementaire d’Evaluation des Choix Scientifiques et Technologiques, at 183 where the authors describe the ‘fear of some innovations, and the rise of the new obscurantism’.

¹² S. Gardiner, ‘A Core Precautionary Principle’, *The Journal of Political Philosophy*, 2006, 14: 33-60, at 33.

¹³ See Sunstein (2003), *supra* note 7, at 1004-5.

¹⁴ See F. Moderne, ‘Légitimité des Principes Généraux et Théorie du Droit’, *RFDA*, 1999, at 722 ; N. de Sadeleer ‘Les Avatars du Principe de Précaution en Droit Public: Effet de Mode ou Révolution Silencieuse?’, *RFDA*, 2001, at 547.

¹⁵ Second International Conference on the Protection of the North Sea, Ministerial Declaration.

... [B]y combining ... approaches based on emission standards and environmental quality objectives, a more precautionary approach to dangerous substances will be established;

[The parties] [t]herefore agree to ... accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects ('the principle of precautionary action').¹⁶

Following those early recognitions, the precautionary principle has accessed worldwide recognition as references to this principle increased gradually in the 90s in a number of international treaties. For instances, the precautionary principles will be present in environmental treaties¹⁷ such as the International Conference on the North Sea (1990), the Bergen Declaration following the Conference on Sustainable Development (1990), Vienna Convention on Ozone Layer, Agenda 21, Framework Convention on Climate Change, Principle 15 of Rio UN Declaration, and the Wingspread Conference (1998).¹⁸ In the US, the precautionary principle emerged in the early 90s notably with the *Massachusetts Toxics Use Reduction Act* of 1990 and the *Clean Air Act* of 1993. In Germany, the precautionary principle is a much better entrenched principle of law as it has been referred as early as in the 70s¹⁹. The precautionary principle, remaining inherently a legal principle, had recognition in a limited number of texts in the WTO law and the UK law, but enjoys prominent legal recognition under French law.

2.1.1. In WTO law

Under WTO²⁰, the precautionary principle has been repeatedly invoked by the most forceful advocates of this principle – the European Union representatives. Indeed, classically, the precautionary principle had been relied upon by the EU in commercial disputes in order to curb the practice of WTO law.

¹⁶ *Ibid.*, at 1.

¹⁷ A. Trouwborst, *Precautionary Rights and Duties of States* (Utrecht: Martinus Nijhoff Publishers, 2006); A. Trouwborst, 'The Precautionary Principle in General International Law: Combating the Babylonian Confusion', *Review of European Community and International Environmental Law*, 2007, 16(2): 185-95.

¹⁸ Wingspread Conference, 1998. *Wingspread Statement on the Precautionary Principle*, Press release, Racine, Washington, February where the precautionary principle has been defined as following: 'Where an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, bears the burden of proof.'

¹⁹ Since 1971, the German *Vorsorgeprinzip* appears in the environmental programme sketching out the Federal Government agenda on environment and it shall be reinstated in subsequent governmental working documents. See T. O'Riordan and J. Cameron, 'The History and Contemporary Significance of the Precautionary Principle', in T. O'Riordan and J. Cameron (eds.), *Interpreting the Precautionary Principle* (London: Routledge, 1994), 12-30, at 17.

²⁰ The WTO established a Dispute Settlement Understanding which provides for an amicable quasi-judicial dispute resolution mechanism with the Appellate Body as a quasi-court of last resort for commercial dispute arising out of WTO law.

For, the WTO has few written instances of recognition of the precautionary principle. The Appellate Body has classically considered such recognition of the precautionary principle as a highly ‘imprudent’ in judicial instances since the legal valence of the precautionary principle under international law is ‘less than clear’.²¹ The *Cartagena Protocol on Biosafety* of 2000 represents a clear attempt to implicitly enshrine the precautionary principle into WTO law²² with the relevant provisions stating that:

Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism ... shall not prevent that Party from taking a decision, as appropriate, with regard to the import of the living modified organism ... in order to avoid or minimize such potential adverse effects.²³

The Cartagena Protocol allows for restrictions on imports whenever a ‘risk assessment carried out in a scientifically sound manner and taking into account recognized risk assessment technique’.²⁴ The precautionary measures to be adopted are therefore subsequent to a comprehensive risk assessment carried out. To some extent, this provision avoids the adoption of protectionist measures on behalf precaution. However, the burden of providing and paying for the risks assessments rests on the exporter.²⁵

The judicial practice of WTO has incrementally recognised the precautionary principle as a justificatory ground for derogating from the WTO law. On illustrative instance where the Appellate Body had recourse to the precautionary principle is the *EC-Biotech* case under the Sanitary and Phytosanitary Agreement (SPS Agreement). The EU allowed Member States to ban the cultivation of GMOs on their territory, even if they were previously approved by the European Food Safety Agency.²⁶ The US filed a complaint before the WTO Panel due to the alleged breach of Article 5(1) of the SPS Agreement which allowed for more stringent measures than those generally imposed only if a risk assessment was carried out. The EU argued that insufficient scientific information precluded her from carrying out a full-fledged risks assessment as required by Article 5(1) of the SPS Agreement and invoked the precautionary

²¹ See *EC-Hormones* (1998) WT/DS26/AB/R, WT/DS48/AB/R, AB-1997-4 – Report of the Appellate Body, paras. 123-124 where it is judged that

the status of the precautionary principle in international law continues to be the subject of debate among academics, law practitioners, regulators and judges. The precautionary principle is regarded by some as having crystallized into a general principle of customary international environmental law. Whether it has been widely accepted by Members as a principle of general or customary international law appears less than clear. We consider, however, that it is unnecessary, and probably imprudent, for the Appellate Body in this appeal to take a position on this important, but abstract, question. We note that the Panel itself did not make any definitive finding with regard to the status of the precautionary principle in international law and that the precautionary principle, at least outside the field of international environmental law, still awaits authoritative formulation.

²² Adopted at Montreal on 29 January 2000, available at: <https://bch.cbd.int/protocol/>.

²³ Articles 10 (6) and 11 (8) of the Cartagena Protocol.

²⁴ Article 10 (1), together with Article 15 and Annex III of the Cartagena Protocol.

²⁵ Article 15(2) and (3) of the Cartagena Protocol.

²⁶ Article 23 of the Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC [2001] OJ L 106/1.

principle. The WTO Panel rejected the argument of insufficient scientific information, and forced the EU to be consistent with the SPS Agreement.

More particularly, Article 5(7) of the SPS Agreement allows for precautionary measures to be adopted only if:

- The situation, to which safeguard measures can be applied suffers from ‘insufficient relevant scientific information’;
- The adoption of safeguard measures has to be based on ‘available pertinent information’;
- The state imposing safeguard measures has to ‘seek to obtain the additional information necessary for a more objective assessment of risk’; and
- The state in question has to ‘review the safeguard measure accordingly within a reasonable period of time’.

Consequently, while not been written in the SPS Agreement as ‘*a ground for justifying SPS measures that are otherwise inconsistent with the obligations of Members to set out in particular provisions of that Agreement*’, the precautionary principle ‘*finds reflections*’ in Article 5.7 of the SPS Agreement.²⁷ Indeed, as stated in Article 2(2) of the SPS Agreement, SPS measures shall not be ‘*maintained without sufficient scientific evidence, except as provided for in paragraph 7 of Article 5*’. It means that Article 5(7) of the SPS Agreement provides for a deviation from the general requirement that scientific evidence is required for measures to be maintained. In that regard, Article 5(7) is the precautionary principle of the WTO because insufficient scientific certainty justifies regulatory measures restricting or prohibiting imports.

Nevertheless, the precautionary principle is not be understood by the Panel and Appellate Body as relieving any scrutiny ‘*from the duty of applying the normal (i.e. customary international law) principles of treaty interpretation in reading the provisions of the SPS Agreement*’.²⁸ Indeed, the Panel and the Appellate Body do not refrain from scrutinizing onto the risks assessment and the necessity of the precautionary measures adopted to prevent detrimental risks to occur as illustrated in the *Australia-Salmon* case of 1998.²⁹ Moreover, precautionary measures adopted under Article 5(7) of the SPS Agreement must be subject to review within a reasonable period of time, contrary to the EU precautionary principle as discussed below.

There is indeed a risk that the precautionary principle be used for ‘*regulatory protectionism*’³⁰ by prohibiting or restricting foreign products and services on behalf of

²⁷ See *EC – Hormones* (1998) WT/DS26/AB/R, WT/DS48/AB/R, AB-1997-4 – Report of the Appellate Body, para. 124.

²⁸ *Ibid.*

²⁹ See *Australia – Salmon* (1998) Appellate Body Report, *Australia – Measures Affecting Importation of Salmon*, WT/DS18/AB/R, paras. 119-38 where the Appellate Body detailed that, according to Article 5(5) of the SPS Agreement, ‘some evaluation of the likelihood or probability’ of risks is not sufficient for the adoption of precautionary measures (para. 124) and warned against ‘disguised restrictions’ (paras. 164-166).

³⁰ An expression coined by Sykes where it has been defined as ‘any cost disadvantage imposed on foreign firms by a regulatory policy that discriminates against them or that otherwise disadvantages them in a manner that is unnecessary to the attainment of some genuine, non-protectionist regulatory objective’, in Alan O. Sykes, ‘Regulatory Protectionism and the Law of International Trade’, *Chicago Law Review*, 1999, 66(1): 1-46, at 3.

environmental protection, consumer protection, health and security concerns, etc. Indeed, the WTO generally sees

the efforts to regulate, restrict, or prohibit the production, sale, and distribution of toxic chemicals to protect health and the environment [under the precautionary principle] as ‘trade restrictions’ and [these] are challenged [...] by countries in which [chemical] companies are based.³¹

Striking the balance between the legitimate concerns raised by the precautionary principle (e.g. environmental protection, and consumer protection) and the threat of regulatory protectionism is a difficult task owed by the judicial body of the WTO. To summarize the precautionary principle under WTO law, it is apparent that no such principle is recognised but only measures are accepted, mainly under the SPS Agreement, only if they are reviewed within a reasonable period of time and after having carried out a comprehensive risk assessment from where no justification of precautionary measures *per se* can be found.

2.1.2. In UK law

Britain has historically accepted the precautionary *approach* (rather than principle) with the Declaration of the Second Conference on the North Sea in 1987. The expression *precautionary principle* as such will only appear with the 1990 White Paper *This Common Inheritance: Britain’s Environmental Strategy*. The White Paper introduced the precautionary principle to UK law with a narrow ambit (only invocable against Government and administrations) and with an economic consideration (the need to balance costs and benefits).³²

Interestingly, the UK does not have well-acknowledged principles but rather a number of statutory responses to pollution control, to risk analysis, and to the general application of the duty of care.³³ Indeed, the concept of ‘sustainable development’ may yield in the UK a similar meaning than the precautionary principle. For instance, Section 10 of the Planning Act of 2008 states that ‘the Secretary of State must, in exercising those functions, do so with the objective of contributing to the achievement of sustainable development’. This ‘sustainable development’ encompasses long-term risks and scientific uncertainty which call for prudent decision-making.

The failure of the precautionary principle to be recognised under UK law has been illustrated with the 1996 case from the Court of Appeal *Duddrige*.³⁴ In this case, the applicant failed to rely on the precautionary principle but the Court relied on the notion of sustainable development.³⁵ However, with respects to the EU Habitats Directive, the Court of Appeal has timidly accepted that decision-makers are bound a principle of precaution as elaborated by the

³¹ R. F. Quijano, ‘Elements of the Precautionary Principle’, in Joel A. Tickner (ed.), *Precaution, Environmental Science and Preventive Public Policy* (Washington: Island Press, 2003), 21-8, at 24.

³² T. O’Riordan and J. Cameron, *Interpreting the Precautionary Principle*, (London: Routledge, 2013) 1994 note 19), at 238-9; See Gardiner (2006), *supra* note 12.

³³ R. Macrory and J. Thornton, ‘Environmental Principles: Will They Have a Legal Role after Brexit?’, *Journal of Planning & Environmental Law*, 2017, 9: 907-13.

³⁴ *R. v. Secretary of State for Trade and Industry, ex part Duddrige* (1996) 2 CMLR 361. In this case, the applicant wanted to obtain from the Secretary for Trade and Industry the restriction of emissions of electromagnetic fields from electricity cables.

³⁵ More recently, see *Friends of the Earth Ltd’s Application for Judicial Review, Re* (2016) NIQB 91 ; *Feeney v. Secretary of State for Transport* (2013) EWHC 1238 where the precautionary principle, while referred to, has been unpowerful to the applicant’s challenge of regulatory environmental measures.

CJEU.³⁶ Be that as it may, UK Courts and regulatory bodies are keen to apply the precautionary principle only to the extent they must conform to EU law – a short-term prospect given Brexit.³⁷ There is therefore no sincere willingness to create and/or apply a UK precautionary principle as evidenced by the 2017 case of Preston where a UK principle of precaution was again unsuccessful.³⁸

2.1.3. In French law

Following debates on the Rio Declaration on the Environment in 1992, France has been the first country in the world to codify the precautionary principle in its legal order with the Article L.200-1 of the Rural Code, stating that

the absence of certainties, given the scientific and technological knowledge of a given time, must not postpone the adoption of effective and proportionate measures aimed at preventing the risks of serious and irreversible damages to the environment for an economically acceptable cost.³⁹

It is therefore obvious that the ambit of the precautionary principle was, from its onset, much wider than the sole environmental issues in order to encompass issues such as food issues and health issues. Moreover, the cost of the precautionary principle is acknowledged – only is legally required that this cost to be considered as an ‘*acceptable*’ cost. Finally, proportionality of the regulatory interventions is deemed to be a powerful methodological tool to assess the legitimacy of the regulations adopted under the precautionary principle.

French law being highly influenced by EU law, it is necessary to delve first into the EU precautionary principle before scrutinizing into the French version of the precautionary principle. With the Maastricht Treaty of the European Union of 1992, the precautionary principle has become a general principle of EU law⁴⁰ with Article 130-R-2⁴¹ – today Article

³⁶ *Smyth v. Secretary of State for Communities and Local Government* (2015) EWCA civ 174.

³⁷ See Macrory and Thornton (2017), *supra* note 33.

³⁸ See *Preston New Road Action Group v. Secretary of State for Communities and Local Government* (2017) EWHC 808. See Encyclopedia of Planning Law and Practice : Monthly Bulletin (2018) 5-034.C1, Feb. 07-08.

³⁹ The original text is as followed:

l'absence de certitudes, compte tenu des connaissances scientifiques et technologiques du moment, ne doit pas retarder l'adoption de mesures effectives et proportionnées visant à prévenir un risque de dommages graves et irréversibles à l'environnement à un coût économiquement acceptable.

⁴⁰ See the Judgement of the 26 November 2002 on *Artegodan* (T-74/00), at 184 de la Cour de Justice de l'Union Européenne affirmant

le principe de précaution peut être défini comme un principe général du droit communautaire imposant aux autorités compétentes de prendre des mesures appropriées en vue de prévenir certains risques potentiels pour la santé publique, la sécurité et l'environnement, en faisant prévaloir les exigences liées à la protection de ces intérêts sur les intérêts économiques .

See also the judgments of the 5 May 1998 C-157/96 (*Queen c. Ministry of Agriculture*, at 63-64) and C-180/96 (*Royaume-Uni c. Commission*, at 99-100) ; Judgment of the 11 of September 2002 T-13/99 (*Pfizer*, at 444) and T-70/99 (*Alpharma*, at 355) ; Judgment of the 7 September 2004 C-127/02 (*Waddenzee*, at 45) ; Judgment of the 23 September 2004 C-280/02 (*Commission c. France*, point 34).

⁴¹ The precautionary principle has been inserted in numerous EU norms such as Regulation 1907/2006, Directive 2001/18/CE, Regulation 178/2002, Regulation 1107/2009. On the importance of the precautionary principle in EU law, see T. Christoforou, ‘The Origins, Content and Role of the Precautionary Principle in European Community Law’, in C. Leben and J. Verhoeven (eds.), *Le Principe de Précaution: Aspects de Droit International et Communautaire* (Panthéon-Assas ed., LGDJ, 2002); A. Alemanno, ‘Le Principe de Précaution en Droit Communautaire: Stratégie de Gestion des Risques ou Risque d’Atteinte au Marché Intérieur?’, *Revue du Droit de l’Union Européenne*, 2001, at 917; G. BOSSIS, ‘Le Principe de Précaution au Niveau International et

191-2 of the Treaty on the Functioning of the European Union (TFEU).⁴² The EU precautionary principle has been applied with some inconsistencies between the Commission and the EU courts.⁴³ Indeed, the European Commission's willingness to apply the precautionary principle has not been consistently followed by the EU judicial authorities.⁴⁴ However, the EU precautionary principle has been successfully invoked in a number of cases such as in *Pfizer*,⁴⁵ *Alpharma*,⁴⁶ *Monsanto*,⁴⁷ *Artogodan*,⁴⁸ and *Gowan*⁴⁹ judgments. The shortcoming of the EU precautionary principle however lies in the fact that decisions taken according to the precautionary principle must not be reviewed whereas scientific uncertainty justifying the application of the precautionary principle may have disappeared throughout time.⁵⁰

Article 191-2 TFEU, transposed into French law with the so-called 'Barnier Law' of 2 February 1995, has been codified with Article L.110-1-II of the French Environment Code. It defines the precautionary principle as such:

The precautionary principle, according to which the absence of certainties, given the scientific and technological knowledge of a given time, must not delay the adoption of effective and proportionate measures aimed at preventing the risks of serious and irreversible damages to the environment for an economically acceptable cost.⁵¹

This definition is to be confronted with the one adopted by the Conseil d'Etat, the supreme administrative court in France, in his 1998 Report according to which the decision-maker had to evidence the absence of any damages of the envisaged action for such action not

Communautaire', *Droit de l'Environnement*, 2001, No. 90, No. Spécial, Actes du Colloque Organisé par l'Université de l'Artois, 176-81. On the judicial restraint exercised by European courts in respect to the judicial control of the precautionary principle, see A. Alemanno, 'Annotation of European Court of Justice, Case C-79/09, *Gowan Comercio Internacional e Servigos Lda v. Ministero Della Salute*', *Common Market Law Review*, 2011, 48(4): 1329-48; for an opposite perspective, see A-M. Janssen and N. Rosenstock, 'Handling Uncertain Risks: An Inconsistent Application of Standards? The Precautionary Principle in Courts Revisited', *European Journal of Risk Regulation*, 2016, 1: 144-54.

⁴² G. Majone, 'What Price Safety? The Precautionary Principle and Its Policy Implications', *Journal of Common Market Studies*, 2002, 40(1): 89-109. See the Commission Recommendation: *Communication de la Commission sur le Recours au Principe de Précaution (COM/2000/0001)* final.

⁴³ R. Löfstedt, 'A Possible Way Forward for Evidence-Based and Risk-Informed Policy-Making in Europe: A Personal View', *Journal of Risk Research*, 2014, 17: 1089-108; K. Garnett and D. Parsons, 'Multi-Case Review of the Application of the Precautionary Principle in European Union Law and Case Law', *Risk Analysis*, 2017, 37(3): 502-16, arguing that the 'decision whether or not to apply the precautionary principles appears to be poorly defined, with ambiguities inherent in determining what level of uncertainty and significance of hazard justifies invoking the precautionary principle'.

⁴⁴ *Ibid.*, at 510-13. See Gardiner (2006), *supra* note 12.

⁴⁵ Judgment of the Court of First Instance of 11 September 2002, T-13/99, *Pfizer Animal Health SA v. Council* [2002] ECR II-03305.

⁴⁶ Judgment of the Court of First Instance of 11 September 2002, T-70/99, *Alpharma Inc. v. Council* [2002] ECR II-03495.

⁴⁷ ECJ Judgment of 9 September 2003, C-236/01, *Monsanto Agricoltora Italia SpA* [2003] ECR I-08105.

⁴⁸ Judgment of the Court of First Instance of 3 March 2010, T-429/05, *Artogodan GmbH v. European Commission* [2010] ECR II-00491.

⁴⁹ ECJ Judgment of 22 December 2010, C-77/09, *Gowan* [2010] ECR I-13533.

⁵⁰ See Garnett and Parsons (2017), *supra* note 43, at 512.

⁵¹ The original text reads:

Le principe de précaution, selon lequel l'absence de certitudes, compte tenu des connaissances scientifiques et techniques du moment, ne doit pas retarder l'adoption de mesures effectives et proportionnées visant à prévenir un risque de dommages graves et irréversibles à l'environnement à un coût économiquement acceptable.

to violate the precautionary principle.⁵² Also, Article L.110-1-II of Barnier Law has introduced the prevention principle, or ‘principle of preventive action’, which regulates the evidenced risks to the environment and which has been defined as such:

The principle of preventive and corrective action, by priority to the causes of the environmental damages, and by using the best available techniques for an economically acceptable cost. This principle implies the avoidance of the biodiversity damages and its outsprings; if not possible, to reduce the ambit of damages; finally, in last resort, to compensate inevitable and un-reduced damages while taking into consideration species, natural habitats, and of any disturbed ecological dimensions.⁵³

Most importantly, the Fifth Republic’s Constitution of 1958, with the Environmental Charter having amended the Constitution in 2005, now enshrines, for environmental matters only, the precautionary principle with the following words:

If damages, although under uncertainties given the scientific knowledge, could jeopardise the environment in a serious and irreversible manner, public authorities ensure, by applying the precautionary principle in their respective areas of competences, that risk assessment procedures and proportionate and interim measures are implemented in order to anticipate the occurrence of damages.⁵⁴

This constitutional recognition of the precautionary principle is unique in the world since France is the only country having constitutionalised the precautionary principle so far.⁵⁵ Nevertheless, the constitutional valence of the precautionary principle in France has not

⁵² Conseil d’État (1998), *Rapport public 1998 – Réflexions sur le droit de la santé*. Paris: La Documentation française, where the precautionary principle is defined as

a new concept defined by the obligation for the public or private decision maker to implement an action or to reject an action given the possible risks. In that vein, it is not sufficient to conform its own conduct to the known risks. The decision maker must also evidence that, given the scientific knowledge, there is an absence of risks.

⁵³ The original text reads:

Le principe d’action préventive et de correction, par priorité à la source, des atteintes à l’environnement, en utilisant les meilleures techniques disponibles à un coût économiquement acceptable. Ce principe implique d’éviter les atteintes à la biodiversité et aux services qu’elle fournit ; à défaut, d’en réduire la portée ; enfin, en dernier lieu, de compenser les atteintes qui n’ont pu être évitées ni réduites, en tenant compte des espèces, des habitats naturels et des fonctions écologiques affectées.

⁵⁴ The original text reads:

Lorsque la réalisation d’un dommage, bien qu’incertaine en l’état des connaissances scientifiques, pourrait affecter de manière grave et irréversible l’environnement, les autorités publiques veillent, par application du principe de précaution et dans leurs domaines d’attribution, à la mise en œuvre de procédures d’évaluation des risques et à l’adoption de mesures provisoires et proportionnées afin de parer à la réalisation du dommage.

⁵⁵ See Bernard Accoyer, President of the French National Assembly, who argued in 2010 that:

Notre pays est le seul à avoir inscrit le principe de précaution au plus haut niveau de sa hiérarchie des normes. S’il n’est pas question de revenir sur sa constitutionnalisation, nous devons néanmoins nous interroger sur les dérives qu’entraîne une interprétation erronée, sur les conséquences de son extension au domaine sanitaire et réfléchir, comme le prescrit l’article 5 de la Charte de l’environnement...

in B. Accoyer (2010) ‘Séminaire Parlementaire sur l’Évaluation de la Mise en Œuvre du Principe de Précaution’, Comité d’Évaluation et de Contrôle des Politiques Publiques, 2010, Paris : Assemblée Nationale, at 3; Voir également C-O. Doron, ‘Le Principe de Précaution: de l’Environnement à la Santé’, in *La Santé Face au Principe de Précaution* (Les Cahiers du Centre Georges Canguilhem, Presses Universitaires de France, 2009/1 (N° 3)), 3-40, at 5.

incentivized the French judges to endorse this principle with an enthusiastic approach. Too limited in its application for proponents of the precautionary principle⁵⁶, this principle remains marginal when it comes to judicial checks of administrative acts in light of legislation and applied indecisively across areas of laws⁵⁷ and across courts (Conseil Constitutionnel, Conseil d'Etat). However, the Court de Cassation, the supreme civil court in France, has recognised the precautionary principle in a judgment delivered in 2010 as a potential basis of civil liability.⁵⁸

All in all, the precautionary principle, regulating hypothetical risks, has progressively come to the fore as a methodological solution to the failure of addressing risks under the sole prevention principle which regulates evidenced risks. Indeed, following the numerous industrial and ecological scandals such as *Chernobyl* in Ukraine, the *Bhopal* in India or *ESB* in Europe, it appeared to decision-makers that *ex ante* prevention only does not suffice to prevent the damages from occurring *ex post*. Therefore, the precautionary principle reveals distrust both towards institutions tasked with risks management and distrust towards the various stakeholders such as the scientific community, the so-called 'experts', the media, the industrial and corporate power, the administrative and political power.⁵⁹

Due to the numerous excesses⁶⁰ in implementing the precautionary principle⁶¹ given that innovation can be stifled from such excesses, the precautionary principle as enshrined in the French Environment Charter was subject to a constitutional reform proposal by Senator

⁵⁶ See M. Deguergue, 'Les Avances du Principe de Précaution en Droit Administratif Français', *RIDC*, 2006, 2: 621-641, at 624. Voir également C. Cans, *Le Principe de Précaution, Nouvel Élément du Contrôle de Légalité* (RFDA, 1999), at 750 ; A. Rouyere, *L'Exigence de Précaution Saisie par le Juge* (RFDA, 2000), at 266.

⁵⁷ *Ibid.*, at 624-9. Deguergue (2006), *supra* note 56

⁵⁸ Cass civ 3e, 3 mars 2010, (2010) *Bull civ III*, n° 08-19.108. In this instance, the owners of a land located close to a mineral water spring drilled the field for gardening in spite of a pollution risk according to the water company running the drill. The Court of Cassation, the civil supreme court in France, rejected the appeal while reaffirming the precautionary principle, enshrined in Article L.110-1 II 1° of Environment Code, was inapplicable in this case because 'the pollution risk having being explicitly excluded from the court expert, the precautionary principle cannot be applied here'. Therefore, an implicit interpretation of this case concludes that, in case of scientific uncertainties and in case of serious and irreversible damages, the liability of the land owners could have been engaged. See M. Hautereau-Boutonnet and J-C Saint-Pau, 'L'Influence du Principe de Précaution sur le Droit de la Responsabilité Civile et Pénale Comparé', *Rapport Mission de recherche Droit et Justice*, 2016, available at: www.gip-recherche-justice.fr/wp-content/uploads/2017/01/L'INFLUENCE-DU-PRINCIPE-DE-PRÉCAUTION-SUR-LE-DROIT-DE-LA-RESPONSABILITÉ-CIVILE-ET-PÉNALE-COMPARÉ-15-décembre-avec-annexe-rapport-GIP.pdf, at 28.

⁵⁹ See Kourilsky and Viney (1999), *supra* note 10, at 13.

⁶⁰ See the Senator Jean Bizet's Advice wherein he argues that, after 10 years of application,

the result of the application of this new constitutional principle reveal its limits. Abusively interpreted oftentimes, the precautionary principle has encountered some practical difficulties in idifficultiesn and had fuelled fears more significant than initially thought by the Constitution-maker to such an extent that some authors call for its erasal from our Constitution.

In Avis du Sénateur Bizet presented

on behalf of the Commission on Sustainable Development, on Infrastructures, on Planning on the Constitutional Law proposed by M. Jean Bizet and other colleagues aiming at modifying the Environmental Charter in order to express more clearly that the precautionary principle is also an innovation principle.

14 May 2014, at 6.

⁶¹ See Fondation Concorde, 'Principe de Précaution', *Oser le Risque*, 2015, available at: <http://fondationconcorde.com/?p=567>; for an opposite analysis on environmental issues, see S. Hansen and J. Tickner, 'The precautionary principle and false alarms – lessons learned', in EEA (2013) *Late Lessons From Early Warnings: Science, Precaution, Innovation* (Copenhagen: European Environmental Agency Report 1/2013, ISSN 1725 9177), available at: <https://www.eea.europa.eu/publications/late-lessons-2> stating that only 4 cases out of 88 cases were subject to regulatory errors.

Jean Bizet submitted on the 3rd of December 2013.⁶² The proposal has not yet been analysed and debated in commissions or in plenary sessions. Should this reform be successful, the precautionary principle would be better balanced with the innovation requirement and the need to protect the scientific spirit.⁶³ Indeed, the ‘*economically acceptable cost*’ would be introduced in a similar fashion as it is worded in the Barnier Law.⁶⁴ The precautionary principle pertains to the need for security in ecological matters, health matters, environmental and human-related matters. The philosophy underpinning of the precautionary principle, as decent as it may be, produce economic costs due to the inherently biased approach of the precautionary principle.

2.2. Detrimental Consequences

Incentivizing to listen more carefully to the anticipation of bad consequences rather than good consequences,⁶⁵ the precautionary principle is an economic and social principle embracing risk aversion as a biased attitude. This risk aversion, resembling sometimes a ‘*zero-risk*’⁶⁶ objective whenever an ‘*integrist*’⁶⁷ viewpoint is endorsed by public decision makers, is both economically and legally detrimental. Indeed, the precautionary principle has mainly two drawbacks – a costly risk aversion, and a weakening of liability theory – corresponding to a law perspective and an economic perspective respectively.

2.2.1. Economic perspective

The precautionary principle lessens the level of innovation, and thus competitiveness, due to the inherent risk aversion it encompasses. But, this risk-aversion is economically sub-optimal. For, from the standpoint of economic optimality, neither risk-aversion, nor risk-loving are desirable.⁶⁸ Risk aversion creates opportunity costs to innovation by stifling innovatory spirit and/or by minimising outlets derived from innovations. On the other hand, risk-loving creates

⁶² See the legislative dossier on French Senate: www.senat.fr/dossier-legislatif/pp113-183.html (accessed 19 July 2018).

⁶³ *Ibid.* See also, *Avis Sénateur Bizet*, at 6.

⁶⁴ Article 5 modified by the Environment Charter, available at: www.senat.fr/leg/tas13-125.pdf (accessed 19 July 2018).

⁶⁵ H. Jonas, *Le Principe Responsabilité*, (Paris: Flammarion, 1998), at 73. Birraux and Déaut (2012), *supra* note 11, at 183.

⁶⁶ P. Rucheton, ‘Société du Risque Zéro’, *Revue Risques*, Octobre/Décembre 1997, at 49.

⁶⁷ Hearing of Guy Carcassonne the 3/12/2003 on the Constitutional Bill for the Environment Charter quoted in Fondation Concorde (2015), *supra* note 61. See also See Gardiner (2006), *supra* note 12, at 37, who discusses the ‘ultraconservative precautionary principle’.

⁶⁸ Between two alternatives yielding the same respective net benefits, a risk averse individual will prefer the less risky alternative. Between the same alternative, a risk loving individual will choose the most risky alternative. Finally, among the same alternative, a risk neutral individual will be indifferent to either of the two alternatives since both alternative yield the same net expected benefits. The indifference curve is therefore linear for risk neutral individuals. This linearity enables the risk neutral individual to minimise insurance costs against risks and enables her to optimally analyse and assess the net benefits of every alternative available. Risk neutrality is tantamount to economic optimality since costs caused by cognitive biases (risk aversion or risk loving) are minimised in order to maximise the economic rationale of the decisions made by the economic actor. Informational uncertainty (or risks) induces, in cases of risk aversion and risk loving, to misrepresent the economic reality and thus to incur opportunity costs (or innovation costs in case of risk aversion) or externality costs (in case of risk loving). Only risk neutrality shall induce no cognitive bias and therefore costs: Pareto optimality is thus reached. Therefore, for decision-making under uncertainties, the law must promote and incentivize risk neutral behaviours because of their economic optimality.

externalities due to over-investment and over-exploitation of innovations without taking into account the social and economic costs be bared by third parties.

Consequently, social welfare is maximised whenever economic actors, generally, and innovators, particularly, are neither risk-averse nor risk-lover. They must be risk-neutral: it will be the point when they optimally internalise the costs and benefits generated by innovations without being excessively deterred from innovating.

With the precautionary principle, risk aversion is exacerbated and lubricated by law. Indeed, there is a legal presumption that uncertainties equate threats, presumption that the unsubstantiated equates detrimental risks, presumption that the unknown must be, at all costs, avoided.⁶⁹ This presumption inevitably shapes a detrimental context for growth and innovation.⁷⁰

False positives are most costly than false negatives due to the crystallisation and relative rigidity of regulation on innovation. Scientific evidence of potential for threats is no longer necessary since the precautionary principle protects especially against risks that are not scientifically evidenced.⁷¹ Should scientific risks be ascertained and substantiated, the traditional principle of preventive actions would allow for appropriate measures under a classic liability theory. The shift from a principle of preventive actions towards the precautionary principle inhibits all usefulness for scientific evidence, for reasoned argumentation, for legal, economic and political justifications.

2.2.2. Legal perspective

Precautionary principle, vaguely invoked,⁷² can be said to be detrimental because experimentation, thus innovation, is not allowed. Indeed, costs related to risk aversion impede the rights (and errors) to experimentation and preclude for *ex post* soft regulations over technological products. Innovation would be increased if economic actors could experiment further or if proven risks were regulated *a posteriori*.⁷³ From a legal perspective, the inability to experiment or even to be regulated *ex post* generates innovation costs, especially in high-tech sectors, for the society.⁷⁴ This inability is a direct and tangible consequence of the precautionary principle. However, there are consequences are detrimental yet less perceptible on our legal system.

⁶⁹ See Doron (2009), *supra* note 55, at 7.

⁷⁰ See *Repenser le principe de précaution* (Extrait du Rapport Attali de 2008). See also M. Peterson, 'The Precautionary Principle Should not Be Used as a Basis for Decision-Making', *Science & Society, EMBO Reports*, 2007, 8(4): 305-8, at 306 where it is argued that 'the precautionary principle therefore replaces the balancing of risks and benefits with what might best be described as pure pessimism'.

⁷¹ See C. Gollier, B. Jullien and N. Treich, 'Scientific Progress and Irreversibility: An Economic Interpretation of the Precautionary Principle', *Journal of Public Economics*, 2000, 75: 229-53.

⁷² For the misunderstanding of the precautionary principle and its ambiguous use, see J. Zander, *The Application of the Precautionary Principle in Practice: Comparative Dimensions*. (Cambridge: Cambridge University Press, 2010); K. Whiteside, *Precautionary Principle: Principle and Practice in Confronting Environmental Risk* (Cambridge: MIT Press, 2006).

⁷³ See J. Charrié and L. Janin, 'Répondre à l'Innovation Disruptive', January Report 2017, France Stratégie 2017-2027, available at: <http://francestrategie1727.fr/actions/repondre-a-linnovation-disruptive/> (accessed 19 July 2018).

⁷⁴ See Fondation Concorde (2015), *supra* note 61.

Indeed, the precautionary principle operates a break-up of the causality link classically required in any liability theory. Liability lies, both in Common law and in civil law countries, upon the causal link required between the misdeed and the prejudice. It is only if such causal link is established that liability can be successfully engaged.⁷⁵ Moreover, beyond this causal link requirement, prejudice must be certain and realised.

But, the precautionary principle can potentially⁷⁶ weaken the liability requirements whenever a person has caused, not anymore an experienced harm, but only potential risks: the only fact that the potentiality for serious and irreversible risks has been created is now sufficient for the precautionary principle to be successfully invoked.⁷⁷ Liability is no longer remedial but also anticipatory to any damages caused:⁷⁸ harmful risks only become able to be compensated.⁷⁹

Moreover, the causal link, requiring the link between two materialised factual events (negligence/misdeed and harm/prejudice) requires, under the precautionary principle, the link between one materialised event (the riskfull conduct) and the potentiality of another event (harm). Since damages are only suspected, the precautionary principle could therefore be invoked without a legal basis with respect to the traditional theory of liability.⁸⁰ This weakening of the legal requirements creates legal uncertainty given the uncertainty surrounding factual elements required for liability to be engaged. This weakening can only be justified with a regrettable liability theory based on morality.⁸¹

Legal liability is classically an *ex post* liability: harms are compensated after prejudices are caused. It is necessary to accept some risks given that damages take place only after prejudices are caused. On the other hand, a morally-engrained theory of liability, such as the one portrayed with the precautionary principle, is an *ex ante* liability theory: a judgmental assessment of the risks should refrain an individual to act in order to avoid the realisation of any prejudices. Classic liability theory presupposes a freedom of actions with an obligation to compensate only for those damageable actions. On the other hand, the morally-based liability

⁷⁵ See Hautereau-Boutonnet and Saint-Pau (2016), *supra* note 58; G. Viney, 'L'Influence du Principe de Précaution sur le Droit de la Responsabilité Civile à la Lumière de la Jurisprudence: Beaucoup de Bruit pour Presque Rien?', in *Pour un droit économique de l'environnement, Mélanges en l'honneur de Gilles J. Martin* (Frison-Roche, 2013), at 555 ; M. Boutonnet, 'Bilan et Avenir du Principe de Précaution en Droit de la Responsabilité Civile', *Recueil Dalloz, Dalloz*, 2010, 2662-70.

⁷⁶ See Cass civ 3e, 18 mai 2011, (2011) *Bull civ* III, n° 80; see more generally Hautereau-Boutonnet and Saint-Pau (2016), *supra* note 58, at 30.

⁷⁷ See TGI Grasse, 17 juin 2003, 2003, *Juris Data* 221748; CA Aix en Provence, 8 juin 2004, *D.* 2004, at 2678 ; TGI Nanterre, 18 Septembre 2008, *D.* 2008, at 96 ; TGI Toulon, 26 mars 2006, *Droit de l'environnement* 2006/ 164. See more generally S. Kowouvi, 'Les Troubles Anormaux de Voisinage et les Antennes Relais de Téléphonie Mobile: Une Utilisation Inédite du Principe de Précaution en Matière de Responsabilité Civile', *Responsabilité Civile et Assurances*, 2003, 11: 7; F-G. Trébulle, 'Note sous 2e civ. 15 mai 2008, Confirmation de l'accueil du risque préjudiciable', *RDI*, 2008, at 488.

⁷⁸ C. Thibierge, 'Libres Propos sur l'Évolution du Droit de la Responsabilité (Vers un élargissement de la fonction de la responsabilité civile?)', *RTD civ.*, 1999, at 561; C. Thibierge (2004) Avenir de la responsabilité, responsabilité de l'avenir, *Dalloz, chronique*, p. 577.

⁷⁹ See Trébulle (2008), *supra* note 77, at 488

⁸⁰ See A. Guegan, 'L'Apport du Principe de Précaution au Droit de la Responsabilité Civile', *Revue Juridique de l'Environnement*, 2000, 2: 147-78; D. Mazeaud, Responsabilité Civile et Précaution, *RCA*, 2001, 6: 72.

⁸¹ P. Ricœur, 'Le Concept de Responsabilité: Essai d'Analyse Sémantique', *Esprit*, 1994, 28-48 qui écrit 'tout se passe comme si le rétrécissement du champ juridique était compensé par une extension du champ moral de la responsabilité'.

theory of the precautionary principle presupposes a restriction of actions with a potential right of actions only when no uncertainty is evidenced with respect to prejudices that may be generated. Therefore, the precautionary principle inhibits lots of endeavours since scientific uncertainty always exist.

Consequently, the precautionary principle, based on the weakening of the legal concept of liability in favour of a moral concept of liability, creates legal uncertainty as well as innovation costs, and thus, economic inefficiencies.

3. INNOVATION PRINCIPLE: LAW FOR PROGRESS

The precautionary principle is detrimental, not only because it leads to bad directions, but more especially because it leads to no direction according to Cass Sunstein.⁸² More specifically, insufficiently comprehended, the precautionary principle can be badly implemented, hence exacerbating its detrimental consequences.⁸³ Protecting against non-evidenced risks, the precautionary principle establishes a precautionary environment⁸⁴ detrimental to the promotion of innovation by our legal system.

Precautionary principle, prevention principle, and lastly innovation principle, each of these principles fulfils a different function for risk management as summed up in the following table.

	Prevention Principle	Precautionary Principle	Innovation Principle
Hypothetical Risks Management		X	
Proven Risks Management	X		
Hypothetical Opportunities Management			X
Proven Opportunities Management			X

Oftentimes, decision makers, scholars and media for the prevention principle use the precautionary principle.⁸⁵ It is also not surprising that, given this precautionary regulatory environment, our economies struggle in catching up with the pace of innovation of other economies. The precautionary principle engrained in our legal orders participates in this lack

⁸² See Sunstein (2003), *supra* note 7, at 1004, 'I aim to challenge the precautionary principle here, not because it leads in bad directions, but because, read for all that it is worth, it leads in no direction at all'. In the same vein, see L. Francot-Timmermans and B. De Vries, 'Eyes Wide Shut: On Risk, Rule of Law and Precaution', *Ratio Juris*, 2013, 26: 282-301 où les auteurs concluent :

the precautionary approach can be understood as providing an empty framework for legal responses to distribute modern risks by minimising their production by means of a normative judgement about these risks in the absence of conclusive scientific evidence about their existence, magnitude and (scientific and societal) acceptance. It provides no rules and has no form. Its essence seems to counter legal certainty.

⁸³ See Accoyer (2010), *supra* note 55, at 3

⁸⁴ See Motion of Senator Bizet, *supra* note 60, at 17-8.

⁸⁵ See Birraux and Le Déaut (2012), *supra* note 11, at 173.

of innovation of our economies.⁸⁶ Consequently, the need to counterbalance the precautionary principle with an innovation principle, instilling risks taking and progress enhancement, becomes progressively both an economic and social need.⁸⁷

3.1. The Economic Rationale of the Innovation Principle

The innovation principle will enable innovation to flourish by transaction costs minimisation with respect to innovation. These costs are numerous since, per definition, innovation is only the beneficial outcome, the finding arising out of numerous researches and failures having involved considerable resources ahead of the innovation.⁸⁸ These transaction costs are important. They could be healed by an innovation principle that would work as a premium for investments into innovation. In a practical manner, the innovation principle shall generate two legal effects yielding positive consequences: a balancing exercise of opposite principles of law (1) and a shift in the burden of proof (2).

3.1.1. A balancing exercise

This premium could be legally enshrined so that innovations are incentivised⁸⁹ in a similar fashion to innovation rents generated by technological patents. However, contrary to technological patents, the innovation principle would protect the innovator, not by the grant of a time-limited monopoly power over an innovation, but by a balancing exercise by the administration and judiciary between positive and negative prospects of innovations.

Therefore, the legal reasoning of the decision maker and the judicial reasoning of the judge would balance general principles of law of similar legal valence – meaning the precautionary principle (with its emphasis on negative aspects of the envisaged action/innovation) and the innovation principle (with its emphasis on the positive aspects of the envisaged action/innovation). Similar to the balancing exercise that take place between fundamental freedoms,⁹⁰ the balancing exercise between these two legal principles would aim at attaining an ideal of justice.

⁸⁶ Report of Innovation 2030 Committee – *Un principe et sept ambitions pour l'innovation*, Paris: Documentation Française.

⁸⁷ See Motion of Senator Bizet, *supra* note 60, at 6.

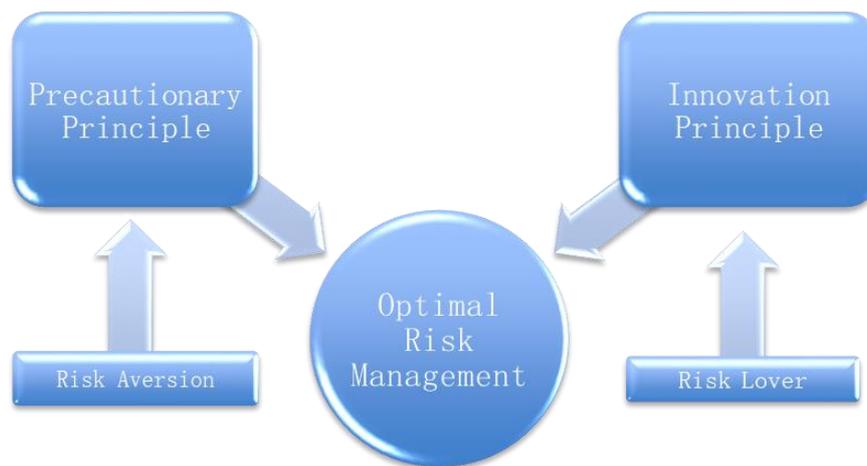
⁸⁸ Jorde et Teece résumant ainsi que 'innovation ... involves uncertainty, risk taking, probing, and re-probing, experimenting, and testing. It is an activity in which 'dry holes' and 'blind alleys' re the rule, not the exception', in T. Jorde and D. Teece, 'Innovation and Cooperation: Implications for Competition and antitrust', *Journal of Economic Perspectives*, 1990, 4: 75-96, at 76.

⁸⁹ See also Nicholas (2011), *supra* note 4, at 788 affirmant ainsi 'Reward structures can influence both the demand side of innovations, by creating opportunities for profit, and the supply side of innovation, by determining the pool of potential innovators'.

⁹⁰ EPSC (2016) Towards an Innovation Principle for Better Regulation. EPSC Strategic Notes. Issue 14, at 3 where it is argued that:

Fundamental rights imply a duty to respect freedom for state authorities. In their subjective dimension they serve as a benchmark for the assessment of all public action interfering with individual freedom. Any action taken by state authorities is considered as an intervention in individual freedom and, as such, faces the pressure of legitimation ... Fundamental rights may have as well an objective dimension, giving them the effect of a principle. In this regard they imply a legal duty to optimise the objective of the relevant individual right, while taking into account opposing principles and individual rights. As a principle, the above mentioned fundamental rights set out the positive obligation to facilitate the exercise of these rights when

The precautionary principle exacerbates risk aversion, already present in all human beings,⁹¹ for entrepreneurs. On the other hand, innovation principle instils risk loving. This conjunction of two legal principles with opposite behavioural and economic effects would produce an optimal middle ground for risk-neutrality. Thus, the precautionary principle becomes intertwined with the innovation principle.⁹² Balancing the two principles will enable the optimal risks management as portrayed below:



3.1.2. Shifting the burden of proof

The precautionary principle imposes upon the entrepreneur, at the top of risk aversion, a burden of proof consisting in requiring from the entrepreneur to demonstrate the absence of harm, actual or potential, current or future, due to the envisaged innovation.⁹³ It is the entrepreneur who bears the burden of proof to evidence the absence of any potential harm. But, this requirement is impossible to satisfy since certainty of harmlessness would require a full certainty and information about the absence of any potential damage caused to anyone or anything.⁹⁴ This state of impossibility would lead to a lessening of the innovation level given a reversed burden of proof.

designing policies and making laws. This can be achieved, for example, through the creation of an innovation-enabling legal framework, infrastructure or the funding of promising ideas.

⁹¹ D. Kahneman and A. Tversky, 'Prospect Theory: An Analysis of Decision Under Risk', *Econometrica*, 1979, 47(2): 263-91, at 279 arguing that 'the aggravation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount'. Voir également See Sunstein (2003), *supra* note 7, at 1008-10. More generally, see G. Bronner and E. Géhin, *L'Inquiétant Principe de Précaution* (Paris: PUF, 2010).

⁹² See Motion of Senator Bizet, *supra* note 60, at 6.

⁹³ See Doron (2009), *supra* note 55, at 8-9. See also the Wingspread Conference, 1998. *Wingspread Statement on the Precautionary Principle* Press release, Racine, Washington, February where the precautionary principle has been defined as followed:

Where an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, bears the burden of proof.

⁹⁴ See O. Godard, 'Le Principe de Précaution comme Norme de l'Action Publique ou la Proportionnalité en Question', CECO-949, 2003, <hal-00242985>, at 13-4.

On the contrary, the innovation principle shifts the burden of proof by requiring, more traditionally, that it is not for the entrepreneur to demonstrate the absence of all damages, but it is only for the entrepreneur to demonstrate the existence of a real innovation. This shift in the burden of proof would enable a drastic change in the behaviours of entrepreneurs by a change of perception of the risks of innovating: it is no longer needed to evidence the uncertainties (i.e. the absence of unsubstantiated risks) but to evidence the real (*i.e.* the creation of an innovation).

3.2. The Protection of the Innovation Principle

The innovation principle is both legally and economically desirable, but also already desired at international and European levels (1) as well as in the UK and in France (2).

3.2.1. In WTO and EU laws

The flexible and open approach of the WTO texts and practices towards the ‘precautionary measures’ vindicates for a relative need for an innovation principle to be enshrined at WTO law. Indeed, WTO law (or more especially the SPS Agreement) requires a review of precautionary measures, emphasises the need for risk assessment to be carried out even in light of scientific uncertainty, and understands the notion of ‘*insufficient scientific information*’ much strictly than the EU does. Nevertheless, the adoption of a WTO-based innovation principle would enable the balancing exercise described above to be plainly and expressly carried out by litigants.

The precautionary principle would be relied upon by the defendant having adopted the blamed “precautionary measures” whereas the claimant would rely upon the ‘innovation principle’ for limiting the extent to which regulatory measures are disguised protectionism chilling out product innovation. This ‘innovation principle’ would be an appropriate regulatory tool to modernise international trade law as vouched recently by the United Nations Commission on International Trade Law’s (UNCITRAL) Congress organised the 4th-6th July 2017 entitled ‘Modernizing International Trade Law to Support Innovation and Sustainable Development’.⁹⁵ The need to strike an adequate balance between innovation and precaution (or ‘sustainable development’) is increasingly considered as the chilling out effect of the precautionary measures on (product) innovation becomes more palatable in digital economies and biotech inventions.

The legal recognition of the innovation principle under WTO law, due to the necessary balancing exercise outlined above in order to reach an optimal risk assessment, cannot be materialised before the legal recognition of the precautionary principle. Moreover, it would make both legal sense and economic sense to proclaim these two principles of law tied together within the same Article. Therefore, Article XX on the General Exceptions of international standards for trade should enshrine the precautionary principle together with the innovation principle. An amendment of Article XX should detail that the justificatory grounds for

⁹⁵ UNCITRAL, ‘Proceedings of the Congress of the United Nations Commission on International Trade Law’, 2017, Vol.4, papers available at: http://www.uncitral.org/pdf/english/congress/17-06783_ebook.pdf (accessed 19 July 2018).

derogating from international standards must be assessed both according to the precautionary principle and the innovation principle – principles that will be further defined by the judicial practice of the Panel and Appellate Body.

In the EU, the pre-eminence of the precautionary principle in EU law, and the tendency of the EU regulator to avoid all sorts of risks (even those only suspected), has paved the way for initiative in order to introduce a sort of innovation principle into EU law.⁹⁶ For instance, a motion from the EU Parliament for technological solutions in the European sustainable agricultural policy (2015/2225(INI)) mentioned that the European Parliament noted the broad consensus for an innovation principle.⁹⁷

Also, with a proposal for a Resolution from the European Parliament B8-0447/2017, the MEP Lieve Wierinck has proposed that the European Parliament invited the European Commission to ensure that industrial policies are compatible with the ‘*innovation principle*’ and that their effects on research and innovation are taken into consideration in impact assessment.⁹⁸ Eventually, the Resolution adopted shall be silent with respect to the ‘*innovation principle*’.⁹⁹ Remarkably, the European Council has recognised, in a press release, the innovation principle and has invited the European Commission to implement it as often as it is possible with the following words:¹⁰⁰

STRESSES that, when considering, developing or updating EU policy or regulatory measures, the ‘Innovation Principle’ should be applied, which entails taking into account the impact on research and innovation in the process of developing and reviewing regulation in all policy domains.

⁹⁶ See COM (2015), ‘Better regulation for better results – An EU agenda’, 2015, available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015DC0215&from=EN> (accessed 19 July 2018); COM(2012) Regulatory Fitness, 746; Commission Européenne, ‘Better Regulation: Guidelines and Toolbox’, 2015, available at: https://ec.europa.eu/info/better-regulation-guidelines-and-toolbox_en (accessed 19 July 2018); Commission Européenne ((accessed 19 July 2018)), ‘State of the Innovation Union’, 2015, available at: http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2015/state_of_the_innovation_union_report_2015.pdf (accessed 19 July 2018), at 9, arguing that

stakeholders see gaps in the completion of the Single Market, which are holding back innovation. They believe that a more innovation friendly regulatory framework is needed and that there needs to be a way to allow for more solutions to be tested, perhaps for instance, by using an ‘innovation principle’.

Commission Européenne, ‘Science, Research and Innovation Performance of the EU. A contribution to the Open Innovation Open Science Open to the World Agenda’, 2016, available at: <https://publications.europa.eu/en/publication-detail/-/publication/744d5735-e1d4-11e5-8a50-01aa75ed71a1>.

⁹⁷ European Parliament, ‘Motion for a European Parliament Resolution on technological solutions for sustainable agriculture in the EU’, (2015/2225(INI)), 2015, available at: www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2016-0174+0+DOC+PDF+V0//EN (accessed 19 July 2018), at para. 75, where it is stated that: ‘Notes broad support for the adoption of the innovation principle, which would require EU legislative proposals to be fully assessed in terms of their impact on innovation’.

⁹⁸ European Parliament, ‘Proposition de Résolution Déposée à la Suite de la Question avec Demande de Réponse Orale B8-0319/2017, Conformément à l’Article 128, Paragraphe 5, du Règlement, sur l’Élaboration d’une Stratégie Industrielle Ambitieuse de l’Union Européenne en tant que Priorité Stratégique pour la Croissance, l’Emploi et l’Innovation en Europe’, (2017/2732(RSP)), 2017, para.11, available at: www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+MOTION+B8-2017-0447+0+DOC+PDF+V0//FR (accessed 19 July 2018).

⁹⁹ See European Parliament, (2017/2732(RSP)), *supra* note 98.

¹⁰⁰ European Council, ‘Better Regulation to Strengthen Competitiveness’, 2016, available at: www.consilium.europa.eu/fr/press/press-releases/2016/05/26/conclusions-better-regulation/ (accessed 19 July 2018).

CALLS on the Commission together with Member States, to further determine its use and to evaluate its potential impact.^[3]

[3]: The Council recalls the Precautionary Principle.

Consequently, the innovation principle could not be substituted to the precautionary principle, but quite the contrary, would function in complementarity with this latter principle, through a balancing exercise as discussed above.

Finally, the European Commission has officially recognised in 2016 that the innovation principle was compatible with its regulatory policy and its objective of ‘Good Governance’ in a working document that is at the basis of its current regulatory policy.¹⁰¹ Moreover, the European Political Strategy Centre has advocated the idea of an innovation principle at the EU level so that EU law fosters, rather than stifles, innovation.¹⁰² This principle would be enshrined in both European secondary law (Regulations and Directives...) as well as in EU primary law (EU Treaties).¹⁰³

3.2.2. In UK and French laws

The legal recognition of the innovation principle is necessary both in the UK and in France. However, the realism of introducing the innovation principle is much greater in France (a civil law country keen to adhere to principles of law) than in the UK (a Common law country already reluctant to embrace the precautionary principle). The innovation principle is a novel principle that would have useful effects in those legal systems.

Following the ‘*Innovation 2030*’ French Committee led by Anne Lauvergeon which has recommended the adoption of the innovation principle beside the existing precautionary principle thus forming the ‘the yin and the yang of the progress of societies’,¹⁰⁴ some attempts have been vainly made to protect this principle under French law. For instance the law n° 2015-990 of the 6th of August for growth, economic activity and equality of economic opportunities 2015 (so-called law ‘Macron II’)¹⁰⁵ had, with an amendment adopted the 15th of June 2015, introduced the innovation principle into law,¹⁰⁶ before this amendment was subsequently removed from the bill.

¹⁰¹ European Commission, ‘Better Regulations for Innovation-Driven Investment at EU Level’, *European Commission Staff Working Document*, 2016, available at: http://ec.europa.eu/research/innovation-union/pdf/innovrefit_staff_working_document.pdf (accessed 19 July 2018).

¹⁰² See EPSC, ‘Towards an Innovation Principle for Better Regulation’, EPSC Strategic Notes, 2016, Issue 14, at 1 où il est précisé que: ‘An innovation principle means ensuring that whenever policy is developed, the impact on innovation is fully assessed. The principle should provide guidance to ensure that the choice, design and regulatory tools foster innovation, rather than hamper it’.

¹⁰³ *Ibid.*, at 2, ‘in this regard Union law may provide for the promotion of innovation. Notwithstanding, one may even think of a Treaty-based “innovation principle”’.

¹⁰⁴ Commission Innovation, 2013, at 14, available at: http://competitivite.gouv.fr/documents/commun/Politique_des_poles/la_nouvelle_France_industrielle/rapport-innovation-2030.pdf (accessed 19 July 2018).

¹⁰⁵ See 9 February 2015, MP Le Dain.

¹⁰⁶ This Amendment aimed at modifying Article L.131-1 of the Research Code to introduce the following provisions:

When carrying out their respective competences, and in particularly in their purchasing policies, public decision-makers promote, implement any form of innovation, understood as all the new solutions proposed in terms of supply of goods, services or public work whenever specific needs cannot be fulfilled by current solutions available on the market. Decision-makers therefore

The innovation principle has re-appeared in the law n° 2016-1691 of the 9th of December 2016 on transparency, fight against corruption, and modernisation of the business life. Introduced in the French National Assembly, the article 44 ter of the bill aimed at defining, the French Research Code, the innovation principle who had to be promoted by public decision makers.¹⁰⁷ A legislative commission has removed this innovation principle due to the uncertainty normative implications of this principle. In spite of a second attempt to introduce this principle into the very same bill, the innovation principle has not yet been proclaimed under French law, not even in the limited Research Code.

The innovation principle, incentivizing risk neutrality and thus economic optimality, would be legally drafted in a clear and simple manner so that the best risk assessment and management can be carried out before prohibitions are delivered. The innovation principle could therefore be drafted with the following words:

Before the adoption of any regulatory measure, the impact on future level of innovation of the envisaged measure shall be thoroughly assessed and discussed.¹⁰⁸

Every impact assessment, every risk management carried out ahead of decision made by a public decision maker would encompass an *innovation assessment* evaluating both risks and opportunities. This regulatory prerequisite – i.e. a full-fledged risk assessment, broader than those currently taking place with the precautionary principle – would allow for more rational and sensitive decision to be adopted ensuring risks and advantages of inventions, innovations, and scientific, artistic and technological creations be fully and objectively assessed.

Moreover, the conjunction of these two principles pertaining to risks management – the precautionary principle and the innovation principle – shall be optimally applied with the principle of proportionality. Indeed, this proportionality principle, economic principle encapsulating a cost-benefit analysis,¹⁰⁹ shall enable public decision makers to approach the

ensure an innovation watch exercise, particularly with respect to innovations proposed by small and medium-sized firms.

The original version in French being:

Dans l'exercice de leurs attributions respectives et, en particulier, dans la définition de leur politique d'achat, les personnes publiques et les personnes privées chargées d'une mission de service public promeuvent, mettent en œuvre pour l'exercice de leurs missions et appuient toute forme d'innovation, entendue comme l'ensemble des solutions nouvelles en termes de fourniture de biens, de services ou de travaux propres à répondre à des besoins auxquels ne peuvent répondre des solutions déjà disponibles sur le marché. Elles s'attachent à ce titre à exercer une veille sur les formes contemporaines d'innovation, y compris celles émanant des petites et moyennes entreprises.

¹⁰⁷ Article 44 ter (new) voted by the National Assembly aimed at enshrining the Amendment pulled out from the Law of the 6 August 2015, modifying Article L.131-1 of the Research Code.

¹⁰⁸ Markus J. Beyrer, 'No Risk, no Innovation: Europe Needs an Innovation Principle', *EurActiv*, 27 mai 2016, available at: <https://www.euractiv.com/section/innovation-industry/opinion/no-risk-no-innovation-europe-needs-an-innovation-principle/>, where it is argued that 'whenever legislation is under consideration, its impact on innovation should be assessed and addressed'. See Business Europe Report, 'Better Framework for Innovation: Fuelling EU Policies with an Innovation Principle'. 2015, available at: www.busseurope.eu/sites/buseur/files/media/imported/2015-00536-E.pdf (accessed 19 July 2018).

¹⁰⁹ A. Portuese, 'Principle of Proportionality as Principle of Economic Efficiency', *European Law Journal*, 2013, 19(5): 612-35.

precautionary principle in a proportionate manner – or reversely, to approach the innovation principle in a proportionate manner.¹¹⁰

However, in order for the innovation principle to work effectively as a balancing tool with the precautionary principle, there should not be a legal debate over the legal valence of each of these two principles. Without such equality in the legal rank of the two legal principles, the risk neutrality with proper balancing could not be efficiently reached.¹¹¹ That is why the innovation principle should, under French law, be constitutionalised by a reform of the Environment Charter. Furthermore, the innovation principle would be introduced under French law with the amendment of Article L.110-1-II of the Environment Code so that, after the precautionary principle before the prevention principle, the so-called innovation principle is proclaimed. Finally, for French law to be fully imbued with the innovation principle, each impact assessment before the adoption of a project or of a bill or regulatory measure shall contain a cost-benefit analysis in light of the innovation principle. On the other hand, UK law may adopt the innovation principle more adequately through White Paper policies and regulatory guidelines rather than by strict principles of law alien to the UK legal system or through impossible constitutionalization. Finally, the EU may revise its regulatory impact assessment guidelines with a legally-binding Commission's decision encapsulating the innovation principle together with the precautionary principle. Consequently, a constitutional reform is needed in France while only a regulatory reforms are required in the EU and in the UK. We shall now turn to the proposed reforms.

4. CONCLUSION: LAW'S TRANSFORMATION FOR FUTURE'S PREPARATION

The innovation principle is required both in France and in the UK and the following recommendations are therefore outlined:

Recommendation 1: *Framing the innovation principle as such: 'Before the adoption of any regulatory measure, the impact on future level of innovation of the envisaged measure shall be thoroughly assessed and discussed';*

Recommendation 2: *Introducing both the precautionary principle and the innovation principle as guiding principles of law under WTO for dispute resolutions under the WTO Panel and Appellate Body in order to embark into an appropriate balancing exercise for judicial bodies with respect to judicial review of national decision makers' risk assessments;*

Recommendation 3: *Amending Article XX of the GATT in order to proclaim that the precautionary principle and the innovation are general principles of WTO law to be protected by the Panel and the Appellate Body;*

¹¹⁰ See Godard (2003), *supra* 94,

¹¹¹ See E. Bézin quoted in J-Y Le Déaut and B. Sido, 'Le Principe d'Innovation', *Rapport Déposé à l'Assemblée Nationale et au Sénat le 27 Novembre 2014, Office Parlementaire d'Evaluation des Choix Scientifiques et Technologiques*, 2014, at 33.

Recommendation 3: *Introducing the innovation principle in the French Environmental Charter with a constitutional amendment;*

Recommendation 4: *Introducing the innovation principle following the precautionary principle in the French Environmental Code;*

Recommendation 5: *Introducing the innovation approach with regulatory reform in the UK;*

Recommendation 6: *Adoption by the European Commission of a legally-binding Decision on ‘Regulatory Impact Assessment’, revising its ‘Good Governance’ guidelines, where the innovation and precautionary principles are equally assessed before any EU decision-making procedure; and*

Recommendation 7: *Introducing the innovation principle and the precautionary principle in every impact assessment preceding a project or a bill both in the EU, the UK and in France.*

The precautionary principle had some merits: it favours the absence of harm rather than the compensation of irreversible (and too often incommensurable) damages. But the precautionary principle alone has numerous drawbacks, among which a tendency to chill innovation out at the WTO level, in the EU, in France and in the UK. Tomorrow’s challenges are, among others, a knowledge economy, the rise of Big Data and the biomedical economy. In short, disruptive innovation is crucial in order to ensure competitiveness and progress of today’s societies.

Innovation shall be brought to the fore through an innovation-friendly regulatory and institutional environment. The race for regulatory efficiency is already taking place all over the world. The WTO as well as European economies, notably France’s and UK’s economies, must adapt their regulatory environments so that the attractiveness of their legal systems is appropriately adapting to social changes. Our legal systems must therefore evolve *quickly* and *powerfully*. *Quickly* with the adoption of the long-awaited innovation principle. *Powerfully* with the adoption of the innovation principle at the highest level of the legal systems and with generalised practice. Only with the relevant regulatory reforms countries will be able to keep up with the race to innovation that is storming for years to come.